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ÆTIOLOGY OF HÆMOLYTIC DISEASE OF THE NEW-BORN.

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THE discovery of the Rh factor by Landsteiner and Wiener[1] was soon followed by an indication of an association between this factor and hæmolytic disease of the new-born. Levine, Burnham, Katzin and Vogel,[2] in an extensive analysis found that more than 90% of the mothers of children with hæmolytic disease lacked the Rh factor in their erythrocytes as compared with only 15% of a random selection of people. These workers further noted that in nearly all of these cases the father and the affected child had Rh-positive blood and that in many instances the mother's serum contained an Rh agglutinin. Their results have been confirmed by other workers.[3,4,5,6] The manner in which the Rh factor causes the disease was first elucidated by Levine and his co-workers. Briefly, it is thought that passage of Rh antigen from a fœtus with Rh-positive blood across the placenta immunizes against the Rh factor the mother whose blood is Rh-negative. The Rh agglutinin so produced in the maternal blood enters the fœtal circulation through the placenta and produces agglutination and hæmolysis of the Rh-positive fœtal red cells.

Since, however, hæmolytic disease of the new-born is a comparatively uncommon affection of infants, it is obvious that the full sequence of events is not completed in all instances in which a fœtus with Rh-positive blood is associated with a mother whose blood is Rh-negative. There is still much to be learnt about factors which determine immunization of the mother and affection of the fœtus. Further, some facts have been recently reported which do not fit in with the accepted theories. For instance, Dockeray and Sachs[6] have detected the Rh agglutinin in the serum of mothers who have subsequently given birth to unaffected children with Rh-positive blood, and attempts have been made to explain the pathogenesis of hæmolytic disease of the new-born in those instances in which the association of Rh-negative blood in the mother and Rh-positive blood in the fœtus does not exist. Evidence has been advanced of the existence of other antigenic agglutinogens in the red cells. These have been termed the Hr factor,[7] the St factor[8] and the KJ factor.[9] It is suggested that these agglutinogens act in a similar manner to the Rh factor in causing hæmolytic disease of the new-born.

Finally, the suggestion made in 1923 by Ottenburg[10] that heterospecific ABO pregnancies may result in pathological infants has been revived, and certain evidence that such a pregnancy may result in hæmolytic disease of the new-born in the infant has been presented by several workers.

The present investigation was undertaken in an attempt to elucidate some of these problems and also to obtain information that might assist in enabling a prognosis to be given for further pregnancies.

NATURE OF INVESTIGATIONS.

The following phenomena were investigated: hæmolytic disease of the new-born, stillbirths of unexplained ætiology, repeated miscarriages and physiological jaundice.

Hæmolytic Disease of the New-Born.

The term hæmolytic disease of the new-born is used to include the conditions known as *icterus gravis neonatorum*, *hydrops fœtalis*, *erythroblastosis fœtalis* and hæmolytic anæmia of the new-born. It is now generally considered that these conditions differ only in severity and time of occurrence. In all, 106 families were investigated. In the selection of the families for investigation no attention was paid to serological findings, but the diagnosis was made on clinical and pathological grounds. The diagnosis of

hæmolytic disease of the new-born was not made unless one or other of the following criteria was established: (*a*) Severe jaundice occurring at or shortly after birth, increasing in degree and associated with a reduction of the red blood cell count and hæmoglobin figure below normal, or with the presence of erythroblasts and other immature red cells in the peripheral blood stream. Minor degrees of this condition have been distinguished from physiological jaundice by the absence in the latter condition of associated anæmia or evidence of abnormal hæmopoiesis. (*b*) Severe anæmia without jaundice appearing at or shortly after birth. (*c*) Post-delivery evidence of *hydrops fœtalis*, either macroscopic or histological.

One hundred and six families were thus selected for investigation and serological investigations were carried out in the following manner: (*a*) In 90 families ABO and Rh typings were performed on the father, mother, some of the living children and, in most cases, on the affected child. (*b*) ABO and Rh typings were performed on the mother and the affected child in a further 16 instances.

Stillbirths of Unexplained Ætiology.

Twenty-six mothers of infants stillborn for no obvious reason have been tested in respect of ABO and Rh groupings.

Repeated Miscarriages of Unexplained Ætiology.

A total of 23 mothers in this group were tested in respect of ABO and Rh groupings.

Physiological Jaundice.

The mothers of 12 infants with physiological jaundice have been tested serologically. Tests were requested in these 12 instances because of the intensity of the jaundice, but in no case was there associated anæmia or erythroblastæmia.

Material.

Red Blood Corpuscles and Serum.

Blood was obtained from mothers by venepuncture with a needle and syringe; serum was separated and inactivated. A suspension of red blood cells in 2·6% sodium citrate also was prepared. Blood was obtained from the fathers and children from finger pricks and a suspension of red cells in 2·6% sodium citrate solution was prepared.

A and B Typing Serum.

Standard A and B typing sera prepared from donors with high titres of β and α agglutinins respectively were used for the ABO typings.

Serum Containing Rh Agglutinin.

The early part of the work was carried out with serum obtained from two patients recently delivered of children suffering from hæmolytic disease of the new-born. As the work progressed additional and more satisfactory sera were obtained from similar sources. The Commonwealth Serum Laboratories have compared the majority of these sera with serum obtained from Dr. Landsteiner and have reported that satisfactory Rh agglutinins were present.

All these Rh agglutinating sera were obtained from group O and group A subjects. The group O sera were used for testing group O cells. The group A sera were used for testing group A cells and were absorbed with saliva containing group B specific substance for testing group B and group AB cells.[12]

No attempt was made to differentiate between the subgroups of the Rh factor, but all serum used gave at least 85% positive reactions when tested against a random selection of the population.

Technique.

Testing Cells for the Rh Factor.

It was found necessary to carry out the Rh tests as soon as possible after collection of the blood. The sensitivity of the Rh agglutinogen deteriorates rapidly and it is felt that little reliance can be placed on negative results obtained with blood that has been collected more than twenty-four hours prior to the test. The cell suspension was diluted with normal saline solution so as to give about 0·5% suspension of cells as judged by the eye. The results are difficult to interpret when stronger suspensions are used. One drop of this suspension and one drop of the serum containing Rh agglutinins were placed in a small test tube, two inches long with an inside diameter of three-eighths of an inch. As a general rule tests were carried out in triplicate, three different sera being used. The tubes were placed in the incubator at 37° C. for two hours. All serum cell mixtures were placed on a microscope slide with a fine Pasteur pipette and examined with the low power lens of the microscope. During the transfer from tube to slide care was taken to avoid unnecessary agitation. Aggregates of three or more cells scattered throughout the mixture have been regarded as indicative of agglutination. The presence of rouleaux may be confusing if a serum with rouleaux-forming properties is used.

Although some workers are confident that they can rely on the appearances of the cell sediments in the tubes as a sign of agglutination,[11] it was felt that microscopic examinations of the deposit were more certain.

Testing of Serum for the Presence of Rh or Other Agglutinins.

Each serum was tested against eight specimens of group O cells selected at random and two specimens of group O cells known to be Rh negative. The eight group O cells selected at random were also tested with a serum known to contain an Rh agglutinin. Each serum was also titrated against one specimen of group O cells known to be Rh positive with all satisfactory Rh typing sera. The cell serum mixtures were placed at 37° C. for two hours and then examined microscopically for agglutination. As some workers[13] have stated that some Rh agglutinins act better at room temperature or refrigerator temperature, all sera have been tested under these conditions. No serum was found which caused Rh agglutination at room temperature or refrigerator temperature and not at 37° C. Moreover, the frequent occurrence of cold agglutination after two hours in the refrigerator made this technique valueless. Rouleaux formation was fairly commonly detected during the examinations of serum from parturient mothers, but with experience was readily distinguishable from true agglutination. In case of doubt the examination was repeated, serum diluted with an equal volume of normal saline solution being used.

Results.

Space does not permit the inclusion of the complete protocols, and an analysis of significant findings must suffice.

1. Hæmolytic Disease of the New-Born.

The Rh Grouping of Mothers of Affected Children.—Among the 90 families fully investigated the mother was found to have Rh-negative blood and the father to have Rh-positive blood in 83 instances. This represents 92% of all the families investigated. In the 16 families in which only the mother and affected child were examined, the mother had Rh-negative blood in 14 and Rh-positive blood in two instances. All these have a total of 97 mothers with Rh-negative and nine with Rh-positive blood (92% Rh negative). These figures are compared in Table I with those obtained by other workers.

Table I.

Investigators.	Number of Cases Investigated.	Number of Mothers with Rh-Negative Blood.	Number of Mothers with Rh-Positive Blood.
Levine, Burnham, Katzin and Vogel[4]	153	141 (92%)	12 (8%)
Wiener[13]	43	37 (87%)	6 (13%)
Race, Taylor, Cappell and McFarlane[4]	50	44 (88%)	6 (12%)
Boorman, Dodd and Mollison[14]	100	97 (97%)	3 (3%)
Present series	108	97 (92%)	9 (8%)

This incidence of mothers with Rh-negative blood is to be compared with the incidence of persons with Rh-negative blood in a random selection of the population as determined by various workers (see Table II).

TABLE II.

Country.	Investigators.	Findings.
England ..	Boorman, Dodd and Mollison. Hoare.[3]	14·85% Rh-negative in 1,610 cases. 15·4% Rh-negative in 1,222 cases.
America ..	Wiener.[4] .. .. .. Landsteiner and Wiener.[1] Levine, Vogel, Katzin and Burnham[2]	14·4% Rh-negative in 777 cases. 15·4% Rh-negative in 448 cases. 13·3% Rh-negative in 1,035 cases.
Australia	Simmons, Graydon, Jakobowicz and Bryce.[17] Present writer	17·67% Rh-negative in 2,593 cases. 15·0% Rh-negative in 2,000 cases.

The Presence of Rh Agglutinins in the Serum of Mothers with Rh-Negative Blood and with Affected Children.—The Rh agglutinin has been detected in the serum of mothers with Rh-negative blood, as shown in Table III.

TABLE III.

Interval after Last Affected Child or During Pregnancy.	Number Examined.	Agglutinin Present.	Agglutinin Absent.
0 to 2 months	52	23	29
2 months to 1 year ..	8	4	4
1 year or more	7	3	4
During pregnancy ..	10	7	3
Not examined	13	—	—
Total	90	37	40

Levine and his co-workers[2] detected the agglutinin in 42 mothers in a series of 141 examined, Boorman, Dodd and Mollison[3] in 93 out of 97 cases, and Race *et alii*[4] in 38 out of 50. The serum of some of the mothers in the present series was examined at various times both before and after the birth of the affected child. These examinations confirmed the findings of other workers that the Rh agglutinin may be very transitory in its appearance. The case of which details are given in Table IV illustrates the point.

TABLE IV.

Serial Number.	Father.	Mother.[1]	Children.
28	O Rh+	O Rh−	1. Male, aged four years, normal. O, Rh+. 2. Female, aged two and a half years, hæmolytic disease at birth. Received eight transfusions. O, Rh+. 3. Male, hæmolytic disease. Died when twelve hours old. O, Rh+.

[1] Mother's serum: When five months pregnant, no Rh agglutinin; when seven months pregnant, no Rh agglutinin; when eight months pregnant, no Rh agglutinin; two days before birth of child, Rh agglutinin detected—very weak; one month after birth of child, no Rh agglutinin.

It therefore seems probable that the Rh agglutinin was not detected in a number of cases because the mother's serum was not examined sufficiently often.

The Relation Between the Presence of the Rh Agglutinin in the Mother and the Severity of the Disease in the Child.—Since it is probable that the Rh agglutinin gradually disappears when the antigenic stimulus is removed, only those families in which the mother's serum was examined in the first two months of the puerperium are considered. No correlation was demonstrated between the severity of the disease in the child and the presence of the agglutinin in the mother, as is seen from Table V.

TABLE V.

Ultimate Result in the Child.	Agglutinin Detected in Mother's Serum.	Agglutinin not Detected in Mother's Serum.
Recovered	14	22
Died	7	4
Hydrops	2	3

The Relation Between the Number of Pregnancies and the Presence of the Rh Agglutinin in the Mother's Serum.—It might perhaps have been expected that with succeeding pregnancies the Rh agglutinin would be more likely to be found in those mothers with an increasing number of pregnancies. But in fact this theory has not been borne out in the 52 mothers with Rh-negative blood who were investigated. Further, it has been found that the mother with no previous affected children was just as likely to have Rh agglutinins in her serum as a mother with one or more affected children.

The Relation Between the Titre of the Mother's Rh Agglutinin and the Severity of the Disease in the Child.—The three cases shown in Table VI are presented because of the high titre of the mother's agglutinin.

TABLE VI.

Serial Number.	Father.	Mother.	Pregnancies.
83	O Rh+	O Rh−[1]	1. Female, aged three years, normal. O, Rh+. 2. Female, hæmolytic disease. Died in twelve hours. O, Rh+.
80	O Rh+	A Rh−[2]	1. Female, aged two and a half years, slight hæmolytic disease. A, Rh+. 2. Female, hæmolytic disease. Two transfusions. A, Rh+.
73	A Rh+	A Rh−[3]	1. Female, aged four years, normal. A, Rh+. 2. Female, aged two hears, hæmolytic disease. Two transfusions. O, Rh+. 3. Female, hæmolytic disease. Two transfusions. A, Rh+.

[1] Mother's serum examined on day of birth: Rh agglutinin titre 1/512.
[2] Mother's serum examined two days after birth: Rh agglutinin titre 1/1024.
[3] Mother's serum examined three weeks after birth: Rh agglutinin titre 1/1024.

In spite of the very high titre of the agglutinin in the mother's serum two of the children recovered after transfusions of Rh-negative blood.

Transfusion of the Mother with Rh-Positive Blood: Effect on Subsequent Pregnancies.—Only two instances in which the mother was definitely known to have received transfusions of Rh-positive blood prior to the pregnancies were encountered (see Table VII). These two instances are

TABLE VII.

Serial Number.	Father.	Mother.	Children.
74	A Rh+	A Rh−[1]	1. Male, aged four years, normal. O, Rh−. 2. Male, aged two years, normal. O, Rh−. 3. Male, hæmolytic disease. One transfusion. Died in twenty-four hours. A, Rh+.
90	O Rh+	O Rh−[2]	1. Six years ago, miscarriage. 2. Female, aged four years, hæmolytic disease. Recovered. O, Rh+. 3. Male, hæmolytic disease. Two transfusions. Recovered. O, Rh+.

[1] Mother's serum: Examined ten days after last child, no Rh agglutinin detected. Mother received two transfusions for post-partum hæmorrhage following the first child. In both instances the blood was Rh-positive.
[2] Mother's serum: Examined five days after the last child, Rh agglutinin present, titre 1/4. Mother received transfusion from husband for hæmorrhage following miscarriage six years ago.

recorded because of the possibility that the transfusion of Rh-positive blood to the mother with Rh-negative blood may have been a factor in the causation of the disease in children with Rh-positive blood born subsequent to the transfusion. It is to be hoped that other workers will investigate the subsequent histories of mothers with Rh-negative blood who have received transfusions of Rh-positive blood.

In both instances the first child with Rh-positive blood was affected with the disease.

Progressive Incidence of the Disease in Successive Pregnancies of Rh-Negative Mothers.—The progressive incidence of the disease is well seen from Table VIII, which shows the outcome of successive pregnancies in the 83 mothers with Rh-negative blood.

TABLE VIII.[1]

Number of Pregnancy.	Normal Children.	Affected Children.	Affected Children who Recovered.	Still-births.	Mis-carriages.	Total.
1	64	10	5	4	5	83
2	31	37	26	6	4	78
3	14	40	20	1	4	59
4	7	28	11	0	2	37
5	4	12	3	1	1	18
6	1	12	4	0	2	15
7	2	6	2	0	1	9
8	0	4	3	0	1	5
9	1	3	1	0	0	4
10	1	1	1	0	2	4
11	0	1	0	0	0	1

[1] The figures from the sixth pregnancy onwards are too small to be significant. This is indicated by the line across the middle of the table.

This table shows clearly that the greater the number of pregnancies in affected families, the greater the danger of affected children, and this in spite of the fact that some of the fathers were heterozygous (Rhrh) and some of the children born had Rh-negative blood and were therefore not susceptible to the disease. Further, the usual history in an affected family is of increasing severity of the disease in succeeding pregnancies. For example, in one family where the father was homozygous (RhRh) and the children therefore necessarily had Rh-positive blood, successive pregnancies resulted as follows:

1. 1934: Normal child.
2. 1935: Child slightly jaundiced at birth.
3. 1937: Child intensely jaundiced, died in spite of transfusion therapy.
4. 1940: *Hydrops fœtalis.*
5. 1942: Miscarriage at six months of pregnancy.
6. 1944: Miscarriage at three months of pregnancy.

Of course if the father is heterozygous (Rhrh) there is an approximately even chance of any pregnancy resulting in the birth of a child with Rh-negative blood who will escape. Table IX shows an example in which such a prognosis was given because the father was known to be heterozygous.

TABLE IX.

Serial Number.	Father.	Mother.	Children.
24	A Rh+	A Rh−	1. Female, aged fourteen years, normal. A, Rh−. 2. Male, hæmolytic disease with subsequent "Kern-Icterus". Died at twelve years of age. 3. Male, normal. A, Rh−.

In exceptional instances after a succession of affected children normal children with Rh-positive blood are born, as is shown in the three family histories set out in Table X.

II. Stillbirths of Unexplained Ætiology.

Among the 26 mothers investigated only four had Rh-negative blood. The husbands of these four women all had Rh-positive blood. No irregular agglutinin was detected in the serum of three of these mothers with Rh-negative blood and no direct evidence was therefore obtained that the Rh factor was concerned in any of these unexplained stillbirths.

TABLE X.

Serial Number.	Father.	Mother.	Children.
19	O Rh+	O Rh−	1. Male, aged three years, hæmolytic disease. One transfusion. Died on fourth day. 2. Male, aged fifteen months, normal. Given one transfusion because of previous history. O, Rh+.
60	A Rh+	O Rh−	1. Male, aged five years, normal. A, Rh+ 2. Male, aged three years, hæmolytic disease. Recovered. A, Rh+. 3. Male, aged fourteen months, normal. A, Rh+. 4. Female, hæmolytic disease. Two transfusions. Recovered. A, Rh+.
68	A Rh+	O Rh−	1. Male. Thirteen years ago died at seven months from wasting disease. 2. Female, aged eleven years, normal. A, Rh+. 3. Male. Ten years ago, hæmolytic disease. Died in a few hours. 4. Male. Nine years ago normal. 5. Male. Six years ago hæmolytic disease. Died in twelve hours. 6. Female. Five years ago hæmolytic disease. Died second day. 7. Male, aged four years, normal. A, Rh+. 8. Female, aged three years, hæmolytic disease. Died in twenty-four hours. 9. Male, aged two years, normal. A, Rh+. 10. Male, normal. O, Rh+.

III. Repeated Miscarriages of Unexplained Ætiology.

Nine of the 23 mothers in this group were found to have Rh-negative blood. Although the number of cases investigated is small, there is a higher proportion of mothers with Rh-negative blood in the group than would be expected. Further evidence that the Rh factor cannot be disregarded as a cause of repeated miscarriages is afforded by the following history.

The father's group was O, Rh+; the mother's group was O, RH−; the first pregnancy occurred eight years ago. The child was normal; its group was O, Rh+. In the past eight years eleven pregnancies have all terminated as miscarriages before five months. The mother's serum was examined two weeks after the last miscarriage, Rh agglutinin was present in a titre of one in four.

IV. Physiological Jaundice.

Only one of the twelve mothers investigated because their children had developed physiological jaundice was found to have Rh-negative blood, and in no instance was an irregular agglutinin detected in the mother's serum.

DISCUSSION.

I. Incidence of the Disease.

In a Random Selection of Infants.—It is difficult to state the incidence of hæmolytic disease in the new-born. Since attention was first drawn to its relationship to the Rh factor more careful clinical and hæmatological investigation of infants has led to an increase in the number of infants whose condition has been diagnosed.

Thirty cases were observed among 15,000 births in one Sydney hospital over a period of five years. Javert[10] gives the incidence as one in every 428 births, whilst a more recent unpublished figure from America places the incidence as one in 200 births. It is probable that this higher figure is nearer the correct incidence.

Amongst Children Born of Mothers with Rh-negative Blood and Fathers with Rh-positive Blood.—It can be shown that in 12·7% of all marriages the mother has Rh-negative blood and the father Rh-positive blood, and 90% of all cases of hæmolytic diseases occur in such families. If it is estimated that one case of hæmolytic disease occurs in every 300 births, it can be calculated that of 43 children

born of a mother with Rh-negative blood and a father with Rh-positive blood only one child will be affected. Since nowadays there are comparatively few families with more than two children, and even in the affected families only 12% of the first born suffer from the disease and 47% of the second born, it is clear that the great majority of marriages in which the mother has Rh-negative blood and the father Rh-positive blood never result in an affected child.

The Remainder.—In the remaining 10% of patients with mothers who have Rh-positive blood it can be calculated that hæmolytic disease occurs only once in every 3,270 pregnancies.

II. Pathogenesis of Hæmolytic Disease when the Mother has Rh-Negative Blood and the Father Rh-Positive Blood.

It is clear enough that the pathogenesis of the disease involves the immunization of the mother who has Rh-negative blood by the fœtus with its Rh-positive blood and the subsequent passage across the placenta of the Rh agglutinin resulting in a disturbance of the hæmopoietic system of the fœtus. However, many of the details of this mechanism are still obscure and some of these will now be considered.

Immunization of the Mother.

Nature of the Antigen.—There is abundant evidence that the Rh factor is antigenic, namely: (i) the specific antibody can be demonstrated in some of the mothers of the children suffering from hæmolytic disease; (ii) the antibody can be demonstrated in some individuals with Rh-negative blood who have received transfusions of Rh-positive blood; (iii) the antibody can be demonstrated in laboratory animals immunized with Rh-positive blood. The antigen, however, appears to be weak, since the antibody cannot always be demonstrated in the serum of mothers of affected children and it is difficult to immunize laboratory animals. Further, while it is true that some persons with Rh-negative blood develop the antibody after two or three transfusions of Rh-positive blood, many require twenty or thirty transfusions. This weakness in antigenicity may in part explain the fact that comparatively few children born of mothers with Rh-negative blood and fathers with Rh-positive blood suffer from hæmolytic disease.

The actual nature of the antigen which immunizes the mother is still obscure. Is it the red cell itself or is it some extracorpuscular Rh substance? This latter hypothesis receives some support from the experiments of Aubert, Boorman and Dodd,[18] in which they showed that plasma from a group A or group B individual injected into a group O individual resulted in an increase in the titre of the respective agglutinin. Boorman and Dodd[20] have demonstrated the presence of a water-insoluble Rh group substance in the tissues of persons with Rh-positive blood, although they were unable to demonstrate it in the serum.

Passage of the Antigen Across the Placenta.—It has been supposed that some placental defect recurring in a particular person must exist to permit of the passage of the Rh antigen. It still remains to be determined whether this is so. Javert[15] has reported the finding of retroplacental clots in these cases and has suggested that these clots destroy the normal placental barrier and presumably allow the red cell to pass across. His findings, however, have not been reported by other workers. Since once an affected child has been born the disease rarely fails to recur in succeeding pregnancies, this phenomenon is more in accordance with the known facts of immunology than with the likelihood of a recurring placental defect.

On the other hand, if a soluble substance analogous to the group A and group B substances is present in the plasma of the fœtus with Rh-positive blood there is no necessity to postulate a placental abnormality or damage. Passage of such a substance might occur through a normal placenta. It might be argued: why does not the group A substance or the group B substance in a fœtus pass across the placenta to a mother belonging to a heterologous blood group? Actually Jonsson[21] has shown that the titre of the mother's α or β agglutinins does rise in these circumstances.

The Rh Agglutinin in the Mother.—It might have been expected that the agglutinin would be constantly found in the serum of the mothers of affected children, but actually in the present series the agglutinin was found in only 37 of the mothers out of the 77 examined. Boorman, Dodd and Mollison demonstrated the antibody in 93 out of 97 mothers, but tested the serum at frequent intervals during pregnancy and after the birth of the child, whereas in the present investigation it was possible to test the serum of many of the mothers only some weeks or months after the birth of the child, and it is known that the antibody is often weak and evanescent.

Transmission of the Rh Agglutinin Across the Placenta to the Fœtus.

In common with other maternal antibodies, the Rh agglutinin passes across the placenta to the fœtal circulation, and Boorman, Dodd and Mollison[14] have actually demonstrated the Rh agglutinin in the serum of affected infants. In the present series no agglutinin was demonstrated in the blood of eight infants which were examined, but intravascular agglutination was not uncommonly seen.

The Lack of Correlation Between the Titre of the Rh Agglutinin in the Mother and the Severity of the Disease in the Child.

It is a not uncommon finding to have a low titre of the Rh agglutinin in the mother's serum and a severe or fatal manifestation of the disease in the children; or, on the other hand, to have a high titre of the agglutinin in the mother and a relatively moderate degree of anæmia in the child.

It is probable that the corpuscles of a group A recipient are protected from a high titre α agglutinin in a group O donor by the group A substance present in the plasma and tissues of the group A recipient. It is probable also that the group A substance in the plasma and tissues of a group A fœtus protects the corpuscles of that fœtus from the α agglutinin if its mother's blood is group O or B. Is there an analogous substance in the fœtus with Rh-positive blood protecting its corpuscles to a greater or lesser extent from the Rh agglutinin in the mother whose blood is Rh negative? As has been previously indicated, Boorman and Dodd[20] have shown that the tissues of the individual with Rh-positive blood contain a water-insoluble, alcohol-soluble Rh substance, and we must presume that this substance is also present in the fœtus with Rh-positive blood and may explain the lack of correlation between the titre of the agglutinin in the mother's serum and the severity of the disease in the child. This protective substance might also explain the finding by Dockeray and Sachs[6] and by Henry[22] of Rh agglutinins in the serum of mothers who gave birth to unaffected children with Rh-positive blood. The presence in some cases and the absence in others of such substances may also account for the exceptional birth of normal children in families which previously had affected children. But investigation of the Rh sub-groups in these latter cases might be enlightening.

Possible Role of the Colostrum in the Disease.

Unless the posibility of birth of a child suffering from hæmolytic disease has been anticipated, the diagnosis is usually not made until some hours or days after birth. Jaundice and its associated anæmia then sometimes develop with alarming rapidity. Witebsky, Anderson and Heide[23] attempted to explain this phenomenon by suggesting that the Rh agglutinin secreted in the colostrum and milk is absorbed from the infant's intestinal canal. These workers demonstrated the presence of the Rh agglutinin in the colostrum from one case, and Langley and Stratton[21] have demonstrated its presence in seven out of ten cases investigated. In the present series the agglutinin was demonstrated in three of four cases examined. It is unknown whether the agglutinin is absorbed from the colostrum in man as it is in many animals, but until the intestinal digestive enzymes are fully developed absorption of the agglutinin is no doubt possible and may be the explanation of the late onset of the disease in some cases.

III. Pathogenesis of Hæmolytic Disease in Rh-Positive Mothers.

It has been assumed that in the 83 mothers with Rh-negative blood the Rh factor was responsible for the hæmolytic disease in the child and a fairly satisfactory explanation of the mechanism can be put forward. But there still remain the children with hæmolytic disease who are born of mothers with Rh-positive blood. The disease in the seven such families investigated in the present series might be explained either by an ABO group incompatibility between the mother and the child or by the presence of an unknown agglutinin in the mother's serum. In five out of the seven families there was an ABO group incompatibility, but in two families the mother and child belonged to the same ABO grouping. It may be pure coincidence that in these two latter cases the father had Rh-negative blood. Unfortunately, the possibility of the presence in the father's cells of an Hr or other agglutinogen could not be investigated owing to the lack of suitable testing serum in this country.

ABO Incompatibility.

In 19% of pregnancies the maternal agglutinins are incompatible with the child's cells, and it would be unreasonable to suppose that passage of these incompatible agglutinins is prevented by a selective impermeability of the placenta. It is more likely that the incompatible agglutinins are absorbed by group specific A and B substances in the fœtus. Such substances are present in the majority of A and B individuals (known as secretors) and have been detected in the fœtus as early as the sixth month of intrauterine life. If an ABO incompatibility is to be considered a causative factor of hæmolytic disease of the new-born, one must suppose either a high titre of the mother's agglutinin or an increase in placental permeability to an agglutinin of normal titre, or an absence of the group specific A and B substances in the fœtus (non-secretor).

IV. Prognosis in Future Pregnancies.

What advice should be given to parents concerning future pregnancies is still a very debatable question. It may be said at the outset that no advice should be given until all attempts have been made to establish the genotype of the father. If he is found to be heterozygous, the parents can be told that at the worst there is an even chance of an affected child. Our knowledge of the effects of therapy, especially transfusion of Rh-negative blood, is at the present time still far from complete; but there is no doubt that such transfusion has saved many infants who would otherwise not have survived.

All details of the family history in relation to the severity of the disease in previous births should be considered. Generally the disease becomes progressively more severe with subsequent pregnancies. But there appear to be instances in which the severity has not progressed beyond a certain point just short of fatal or in which the progression is extremely slight. In rare instances one or more children late in the family appear to escape the disease.

Knowledge is still required of the relationship, if any, between the frequency of pregnancies and the severity of the disease in the offspring. No attempt has been made to investigate this in the present series owing to lack of sufficient data. It has been suggested that a long interval between pregnancies may lessen the severity of the disease.

Our present knowledge enables us to make only a few general statements. When the father is homozygous (RhRh) and there has been an infant with *hydrops fœtalis* or one that has died within a few hours of birth, succeeding pregnancies, except in rare instances, are unlikely to be followed by a living child or by a child that could live even with adequate treatment. On the other hand, a child that survived for some days without treatment is likely to be followed by a child which can be saved with treatment. The relationship of hepato-lenticular degeneration to hæmolytic disease of the new-born is another subject that must be considered in the prognosis, but its discussion is beyond the scope of this paper.

V. Transfusions for the Mother who has Rh-Negative Blood in Relation to Hæmolytic Disease of the New-Born.

Two cases are included in the series in which the mother with Rh-negative blood was definitely known to have received a transfusion of Rh-positive blood. Subsequent children with Rh-positive blood were affected. Boorman, Dodd and Mollison[6] state that Rh-positive cells transfused into a recipient with Rh-negative blood can be demonstrated to survive for the normal time, which is now considered to be about eighty or ninety days. These writers point out that this period is approximately equal to the period during which a woman with Rh-negative blood is subject to the immunizing action of a fœtus with Rh-positive blood. It is possible, therefore, that a single transfusion of Rh-positive blood to a woman with Rh-negative blood sensitizes that woman to the same extent as would a fœtus with Rh-positive blood. The desirability of using Rh-negative blood for giving transfusions to all women with Rh-negative blood of the child-bearing age will arise if this assumption is substantiated in the future.

SUMMARY.

The relationship of blood group factors, especially the Rh factor, to the ætiology of hæmolytic disease of the new-born was studied in 107 instances of the disease.

The mother had Rh-negative blood and the child Rh-positive blood in 92% of the families investigated. An Rh agglutinin was found in the serum of 48% of the mothers examined.

The severity of the disease in the child was not related to the presence of the Rh agglutinin in the mother. The frequency of occurrence and the severity of the disease generally increased with an increasing number of pregnancies, although some exceptions were noted.

The mechanism by which the Rh factor passes across the placenta and immunizes the mother is discussed. The colostrum may play a part in causing destruction of the infant's erythrocytes. It is possible that extracorpuscular Rh substance in the fœtus may absorb some Rh agglutinin before it reaches the Rh-positive erythrocytes.

The ætiology of the disease in mothers with Rh-positive blood is discussed.

The relationship of the Rh factor to the ætiology of repeated miscarriages, multiple stillbirths and physiological jaundice was investigated in a number of instances. The Rh factor was not the ætiological agent in the majority.

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THE INCIDENCE OF EXTRAPULMONARY TUBERCULOUS INFECTION IN FATAL PULMONARY TUBERCULOSIS.[1]

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My conception of clinical tuberculosis is that it is a disease accompanied by repeated episodes of metastasis and body reaction, each of which, theoretically, according to its relative severity, strengthens or weakens the host's resistance. New infection is prevented or accomplished, and the patient cures or kills himself, according to the sum total of the effects of the multiple invasions.(1)

THE occurrence of tuberculous infection in the viscera in patients who are dying of pulmonary tuberculosis is often unsuspected, and even when suspected on clinical grounds its presence must remain unproved unless autopsy is possible. In consequence the prognosis for patients under treatment for pulmonary tuberculosis, difficult enough as it is, is made even more so by such imponderable factors.

We have observed that many of the patients in this survey died with a degree of pulmonary involvement much less than that found in other patients who were ambulatory and active, comparison being made by consideration of radiographs of the lungs. It has been noticed also that some patients, serial radiographic examination of whose lungs, at intervals of three months, has indicated steady improvement in the pulmonary condition, have gradually become worse in their general state, until the disease terminated fatally. In addition, the sections of viscera removed at autopsy for microscopic examination, either as a routine procedure or for special inquiry, were frequently found to be the seat of tuberculosis, suspected neither clinically prior to death nor on macroscopic examination at the autopsy.

It was for the purpose of ascertaining the frequency of extrapulmonary infection in patients who died from pulmonary tuberculosis that this survey was made. The review deals with the results of the examination of autopsy records of patients who died from tuberculosis of the lungs, mainly from two institutions—Gresswell Sanatorium, Mont Park, Victoria, and the Alfred Hospital, Melbourne. In addition, we have included figures from the Austin Hospital, Heidelberg, Victoria, published by A. Penington, in a review of two hundred fatal cases of pulmonary tuberculosis.(2)

It may be explained here that in general the patients admitted to Gresswell Sanatorium are suffering from pulmonary tuberculosis without manifest complication and are males only (children under the age of fourteen years are not admitted); that patients admitted to the Austin Hospital are suffering from pulmonary tuberculosis, both simple and complicated, and are both male and female, and of all ages, although few children are accommodated; and that patients admitted to the Alfred Hospital are suffering from the usual "general hospital" strain, including medical catastrophes and terminal states. (In consequence the figures below are not truly representative of infection in childhood.)

Gresswell Sanatorium Cases.

The Gresswell Sanatorium cases (Table I) comprise 121 cases from 125 autopsies, covering the eleven-year period from 1933 to 1944. In the alimentary tract the small intestine was affected in more than one-half the cases, but much less frequently than Kaufmann's figure of 90%.(3)

Ulcers ranged in number from one to 81 and were seen in all stages of development. Perforation was noted in

TABLE I.
Findings in 121 Gresswell Sanatorium Cases.

Viscera Infected with Tuberculosis. (Macroscopic.)	Number of Cases.	Percentage.
Intestine	62	52·0
Ulcers, small intestine	61	52·0
Perforated ulcer, small intestine	8	7·0
Hyperplastic ileo-caecal type of tuberculosis	15	12·0
Ulcers, large intestine	6	5·0
Vermiform appendix affected	12	10·0
Peritoneum (independent of intestinal lesions)	3	2·5
Liver	3	2·5
Spleen	5	4·0
Kidneys[1]	9	7·0
Adrenals	6	5·0
Larynx and pharynx	27	22·0
Meninges	3	2·5
Pericardium—		
With effusion 4	9	7·0
Adherent 5		
Amyloid disease	7	6·0
Extrapulmonary lesions present in	82	68·0

[1] The substance of this paper was the subject of a communication to the Victorian Society of Pathology and Experimental Medicine, Melbourne, on October 23, 1944.

[1] Tubercle bacilli were isolated from the urine of seven patients who came to autopsy; macroscopic tuberculous renal lesions were present in three cases and absent in four cases. Microscopic examination gave negative results in one case; in the remaining three no microscopic examination was made.

7% of cases, and in several the resultant general peritonitis was the terminal cause of death. Two of these cases have been reported previously.[5]

The hyperplastic ileo-caecal type of tuberculosis was seen in 12% of cases (Penington's series, 4%); this figure is unusually high. Some authorities—for example, Boyd[6]—consider this condition to be bovine in origin, but evidence for this view is slender. Tuberculosis of the vermiform appendix was fairly frequent (10%). Tuberculosis of the pharynx and larynx have been classed together; the relative infrequency of this complication (22%), in view of the opportunity of infection of the parts by direct contact with infected sputum, directs attention to the possibility that infection in this region, as in other parts of the body, may be blood-borne.

In the small group of cases of pericarditis there were four cases of effusion and five of adherent pericardium (total 7%); the last mentioned was possibly a late result of effusion.

Renal tuberculosis (7%) was much less frequent than in the Austin Hospital series (33%) or in the Alfred Hospital group (22%); this was due, in part at least, to the allocation elsewhere of patients with complications—and of all systemic complications renal tuberculosis is the particular form most likely to be manifest clinically, with the possible exception of skeletal tuberculosis.

During this period, Dr. R. Webster, at the Children's Hospital, Melbourne, was conducting investigations on the results of attempts to grow the tubercle bacilli from the urine of patients suffering from pulmonary tuberculosis, apparently uncomplicated; seven patients whose urine yielded a culture came to autopsy, and of these, three had macroscopic renal tuberculosis, the other four having normal renal tracts. Microscopic examination of the kidneys was made in only one of these four cases, and this result also was normal.

Amyloid disease was present in seven cases (6%), compared with the Austin Hospital figure of 12%.

It was noted that Meckel's diverticulum was present in six patients (5%); the figure usually given for this anatomical variation is 2%. In one case the diverticulum was the site of tuberculous ulceration.

In all, extrapulmonary lesions were present in 68% of the cases.

Austin Hospital Cases.

The Austin Hospital cases cover the period from 1935 to 1937, and number 200 (Table II).

TABLE II.
Findings in 200 Austin Hospital Cases.

Viscera Infected with Tuberculosis. (Macroscopic.)	Number of Cases.	Percentage.
Intestines	95	47·5
Kidneys	66	33·0
Spleen	5	2·5
Liver	15	7·5
Bones and joints	13	6·5
Amyloid disease	24	12·0
Extrapulmonary lesions present in	136	68·0

Intestinal infection is roughly of the same degree as in the Gresswell Sanatorium series. Perforation of tuberculous ulcers of the small intestine was noted in 4%.

The main point of contrast is the higher incidence of renal tuberculous lesions, explained partly at least above. Skeletal tuberculosis (6·5%) does not figure in the Gresswell Sanatorium cases, as these patients were not admitted to, or else were not retained at, the sanatorium. Extrapulmonary foci were found in 68%—exactly the same figure as in the Gresswell Sanatorium series.

Alfred Hospital Cases.

Having ascertained the frequency and distribution of extrapulmonary tuberculous lesions in patients of the "sanatorium" class—that is, patients with the clinical diagnosis of "pulmonary tuberculosis"—we decided to extend our inquiry to other cases of tuberculosis of inhalational origin. From the point of view of pathogenesis, there is no distinction between patients who, while suffering from clinically diagnosed pulmonary tuberculosis, develop such complications as tuberculous arthritis or meningitis or generalized miliary tuberculosis, and patients who develop these complications while their primary inhalational lesions are small and have not been detected clinically.

Accordingly, we tabulated the findings at 150 consecutive autopsies on general hospital subjects (the Alfred Hospital, 1935 to 1944) in which any active tuberculous lesions of presumed inhalational origin were present. These comprised nearly all the patients showing tuberculous lesions; we excluded a few cases in which careful search had failed to discover primary foci in the lungs and thoracic lymph glands, and in which abdominal lesions were prominent and may have been due to primary infection by the alimentary route. We did not include those frequent cases in which only old healed or quiescent tuberculous foci were found incidentally in lungs, lymph glands or other parts.

The distribution of tuberculous lesions in the 150 general hospital cases is shown in Table III. The high proportions of urinary (22%) and meningeal (21%) lesions are notable.

TABLE III.
Findings in 150 Alfred Hospital Cases.

Viscera Infected with Tuberculosis. (Macroscopic.)	Number of Cases.	Percentage.
Lungs and/or thoracic lymph glands	150	100·0
Intestines	23	16·0
Peritoneum	18	12·0
Liver	19	13·0
Spleen	20	14·0
Urinary tract	33	22·0
Adrenals	12	8·0
Addison's disease	5	—
Larynx and trachea	8	6·0
Meninges	31	21·0
Pericardium	9	6·0
Proved tuberculous disease	5	—
Epididymis *et cetera* (all with lesions of urinary tract)	9	6·0
Brain (other than meninges)	3	2·0
Bones and joints	9	6·0
Female genital tract	5	4·0
Pituitary gland	1	—
Myocardium	1	—
Extrapulmonary lesions present in	97	65·0

The frequency of adrenal lesions (8%), compared with 5% in the Gresswell Sanatorium series, is also of interest; these twelve patients included five who had clinical evidence of Addison's disease. Tuberculosis of the upper portion of the respiratory tract was noted in only 6%. Noteworthy is the fact that all of the nine patients with tuberculosis of the epididymis and testis also had tuberculosis of the urinary tract; this strongly suggests that the former is secondary to the latter, as suggested by Muir,[6] and not usually due to independent blood-borne infection.

Tuberculous meningitis (21%) was seen at ages ranging from twenty months to sixty years, but was most frequent in adolescence. The primary source of infection in the adults was most often active lesions in the lungs, but in the juvenile patients caseous thoracic lymph glands were responsible more often than primary lung lesions.

The frequency of multiple sites of tuberculous lesions is shown in Table IV. By the term "multiple sites" is meant not merely multiple foci of disease in the one organ or system, but the presence of lesions in two or more distinct organs or systems, as listed in Table III. The high proportion of cases (21%) in which extrapulmonary lesions were present in more than two distinct sites reflects the high proportion of patients with acute or chronic generalized tuberculosis admitted to general hospitals. Many of these, of course, had no clinical history of

pulmonary disease and were admitted to hospital because of meningitis, pyrexia of unknown origin, or general debility.

TABLE IV.

Frequency of Multiple Sites of Tuberculous Lesions in 150 Alfred Hospital Cases.

Sites of Lesions.	Number of Cases.	Percentage.
Pulmonary and/or mediastinal lesions only (22 subjects with other serious diseases)	53	35·0
Extrapulmonary lesions in one site	54	36·0
Extrapulmonary lesions in two sites	12	8·0
Extrapulmonary lesions in more than two sites	31	21·0

Table III also shows that of the 53 patients with tuberculous lesions restricted to the lungs and mediastinal lymph glands, 22 had other serious diseases. These included malignant disease, chronic nephritis and diabetes, and in many cases it was these complaints which had caused death and the tuberculosis had been clinically unsuspected.

Of the entire series of 150 cases of tuberculosis, primarily contracted by inhalation, visible extrapulmonary tuberculous lesions were present in 97 (65%)—a figure almost identical with that found in "sanatorium" cases of "pulmonary tuberculosis".

The Results of Microscopic Examination in Fifty Serial Cases.

In 1940, in the routine examination of microscopic sections of the organs of several patients who had died from pulmonary tuberculosis, we noticed the presence of disseminated microscopic tubercles in the liver and spleen, which had not been suspected on naked-eye examination. We decided to examine a series of such cases to ascertain how frequently such dissemination was present. Accordingly, at fifty consecutive autopsies on subjects of pulmonary tuberculosis, performed at Gresswell Sanatorium and the Alfred Hospital, sections were prepared from the liver, spleen and kidneys. Subjects with visible tuberculous disease in any of these three organs were excluded, as we wished to discover the frequency of unsuspected bloodstream dissemination. Our examination was by no means exhaustive; sections were made from only one block of each of the three organs, the sections each averaging about two square centimetres in area.

Hence our figures are certainly under-estimates. Our findings are shown in Table V. Of the 50 cases, in 33 tubercles were found in the viscera: in the liver in 27 cases; in the spleen in 26 cases, and in the kidneys in three cases. It is clear, then, that in fatal tuberculosis of the lungs, dissemination by the blood stream is present, though unsuspected clinically or on naked-eye examination of the organs, in a high proportion of cases.

TABLE V.

Microscopic Tubercles in Liver, Spleen and Kidney at 50 Consecutive Autopsies on Subjects of Pulmonary Tuberculosis in which These Organs Appeared Clear to the Naked Eye.

Site of Lesions.	Number of Cases.	Percentage.
Liver	27	54·0
Spleen	26	52·0
Kidney	3	6·0
Total cases with microscopic lesions ..	33	66·0

The tubercles ranged from a minute size up to 0·5 millimetre in diameter. Most of them consisted of giant-cell systems—that is, a single central giant cell with a zone of "epithelioid" cells and lymphocytes. Early caseation was present in some cases. Fibrosis was noted in only a few instances. In our 50 cases the presence of gross tuberculous lesions in parts other than the lungs did not appreciably affect the frequency of microscopic dissemination. The most common extrapulmonary disease was tuberculous ulceration of the intestine, which we at first thought might well augment the frequency of microscopic tubercles in the liver. However, this was not the case. Twenty-one of the 50 subjects had tuberculous ulceration of the small intestine. Of these 21 with intestinal lesions, 12 had tubercles in the liver; whilst of the 29 subjects without intestinal lesions, in 15 hepatic infection was found. It seems clear, therefore, that the tubercles in the liver, like those in the spleen and kidney, were an index of general hæmic dissemination and not merely of portal dissemination of bacilli.

Whether the frequent microscopic dissemination we have described is merely a terminal process occurring in a dying patient or is itself a main factor determining a fatal issue is uncertain. We incline to the second view, because generalized miliary tuberculosis of clinically apparent type, which differs from the condition under discussion only in degree, is clearly not merely the result of the moribund state, but is brought about by the sudden entry into the blood stream of many bacilli. The increasing debility of the seriously ill tuberculous patient may, of course, facilitate such entry.

It is of interest to record that Long and Faust, in 1941,[7] in an investigation similar to ours, found tubercles present in single sections of liver and spleen in 66% of cases—a figure identical with ours. These workers also found tubercles in the kidneys in 25% of cases (a figure decidedly exceeding ours), in the adrenal in 16% and in the myocardium and pancreas in 2% each.

It will be noted that the macroscopically normal viscera were infected by tuberculosis in about two out of every three cases, the percentage of extrapulmonary lesions being thus raised to about 90%.

As it will be obvious that spread by the blood stream of tubercle bacilli must have occurred in such patients, even if intermittently, the question of tuberculous bacteriæmia and of attempted culture of tubercle bacilli from the blood is of great importance. We have reread with renewed interest a paper on this subject in THE MEDICAL JOURNAL OF AUSTRALIA some eleven years ago, and note that Penfold and Butler[8] obtained positive results in three of twelve cases of pulmonary tuberculosis. In this article the literature of the subject was fully reviewed to date and the claims of Löwenstein, whose success in this field has never been rivalled, were critically examined.

Comment.

It is probable that in patients suffering from tuberculosis of the lungs the infection has spread by metastasis to remote areas and viscera to a degree that is usually quite unsuspected. At what stage in the disease in any particular patient this metastasis first occurs is a matter for conjecture. The relative ease with which examination of the lungs by X rays enables abnormal states to be revealed should not permit us to overlook the possible occurrence of disease elsewhere in the body, although the existence of such disease in other viscera may be incapable of demonstration in life. The bearing this must have on our conception of the disease and its relationship to medical treatment is obvious. It has been stated that "every case of pulmonary tuberculosis which does poorly but with no increase in the physical signs should suggest intestinal ulceration" (Boyd[9]). It would appear both reasonable and desirable to broaden further our viewpoint, to include not only intestinal ulceration, but also visceral metastatic tuberculosis.

Conclusions.

1. In fatal tuberculosis of inhalational origin in the three main types of institutions dealing with the disease in Victoria, macroscopic extrapulmonary tuberculosis was present in about two-thirds of the cases examined.

2. When the naked-eye examination was supplemented by microscopic examination, the incidence of extrapulmonary tuberculosis was found to be about 90%.

3. It will be apparent that in dealing with patients suffering from pulmonary tuberculosis, there is need to regard the disease as a general disease with localization in the lungs, rather than as a purely local pulmonary infection.

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CORYNEBACTERIUM DIPHTHERIÆ: RESISTANCE TO DRYING; ACQUIRED RESISTANCE AND ITS STABILITY.

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SINCE the studies of Roux, Yersin and Löffler, it has been known that diphtheria bacilli have great resisting power, especially in the dry condition.

Numerous experimenters upon the resistance to drying of diphtheria bacilli include Teague(1) (1913), who found that on glass, at 37° C., the bacilli could not survive over three days. His observation was subsequently quoted by various authors of text-books on bacteriology and by the compilers of the book on "Diphtheria"(2) (1923) published by the Medical Research Council of the Privy Council, London.

Topley and Wilson,(3) in "Principles of Bacteriology and Immunity" (1936), state that diphtheria bacilli "appear to be relatively resistant to drying, though the evidence on this point is somewhat conflicting" (pages 332 and 333).

Wright, Shone and Tucker(4) (1941), working on cross-infection in diphtheria wards, recovered diphtheria bacilli from floor dust collected from a diphtheria ward and kept for a month in a test tube. In another specimen a *gravis* strain remained alive and virulent for two months.

The importance of more precise information on the resistance of diphtheria bacilli to drying is evident from the above work.

During the last two years an opportunity presented itself at the Department of Public Health of New South Wales to carry out an investigation on the resistance of diphtheria bacilli to drying. Further observations have reference to acquired resistance and to its stability under laboratory conditions.

Materials Used.

The materials used were as follows. Two media were employed, (i) nutrient broth at pH 7·4 to 7·5 and (ii) Löffler's serum plates and slopes at pH 6·8. The glassware consisted of microscope slides, three inches by one inch in size, and Petri dishes of standard size. Pure cultures of diphtheria bacilli, recovered in the laboratory from "field" cultures, were used. The intracutaneous test for virulence was employed. In doubtful cases a further test was made subcutaneously. Guinea-pigs weighing from 250 to 350 grammes were used. The temperature in two incubators used for experiments was repeatedly checked. It has been found that for the dry bulb thermometer it varied between 37° C. and 37·8° C., and for the wet bulb thermometer between 21·1° C. and 22·7° C. The relative humidity from the readings of the dry and wet bulb thermometers was between 17% and 25%.

Method.

A scraping of twenty-four hours' pure culture of *Corynebacterium diphtheriæ* on Löffler serum slope, removed with a platinum loop, was emulsified with a large loopful of distilled water to give a density of organisms of approximately 1,000,000,000 per cubic centimetre. The emulsion was spread over an area of approximately one-quarter of a square inch on a glass slide, kept previously for at least twenty-four hours in alcohol (95% strength) and dried over a flame. The films were allowed to dry on the table, placed in a covered dry sterile Petri dish in pairs, film upwards, and put in the incubator, the temperature being 37° C.

After the films had been incubated for the required time a sterile swab-stick was moistened in sterile nutrient broth and then rubbed gently on each of the films. Then the swab-stick was rubbed on a Löffler serum slope and finally immersed in the broth. The stick was left in the broth. Both the Löffler slope and the broth were incubated. The reading of the result of the growth was made after twenty-four, forty-eight and seventy-two hours.

Experiments and Discussion.

The Resistance to Drying on Glass at 37° C.

By means of the above method it has been found that diphtheria bacilli are much more resistant to drying on glass at 37° C. than was recorded by Teague. Altogether 45 strains recovered in the laboratory have been tested during the last eighteen months. Of these, 25 were virulent and 20 avirulent. The most resistant strain found was a virulent strain, which withstood thirty-seven days' drying on glass at 37° C. in an incubator. The results of attempted culture of this strain can be summarized as follows (Table I):

TABLE I.
Virulent Strain Number 2,420.

Days of Drying.	Results of Incubation.	
	Serum.	Broth.
1	Heavy growth.	Growth.
3	Heavy growth.	Growth.
6	Heavy growth.	Growth.
9	Moderately heavy growth.	Growth.
10	Heavy growth.	Growth.
13	25 colonies.	Growth.
14	Three colonies.	Growth.
16	Seven colonies.	Growth.
17	Six colonies.	Growth.
20	One colony.	Growth.
22	Four colonies.	Growth.
24	One colony.	Growth.
29	No growth.	Growth.
34	No growth.	Growth.
37	No growth.	Growth.
38	No growth.	No growth.

The results of attempted culture of the following two virulent strains may also be quoted (Tables II and III):

TABLE II.
Virulent Strain Number 123.

Days of Drying.	Results of Incubation.	
	Serum.	Broth.
1	Heavy growth.	Growth.
2	Heavy growth.	Growth.
3	Moderately heavy growth.	Growth.
4	Heavy growth.	Growth.
7	Moderately heavy growth.	Growth.
9	Moderately heavy growth.	Growth.
11	Thirteen colonies.	Growth.
13	No growth.	Growth.
14	Three colonies.	Growth.
15	No growth.	Growth.
18	One colony.	Growth.
23	No growth.	Growth.
25	No growth.	Growth.
26	No growth.	No growth.

The most resistant avirulent strain withstood fourteen days' drying on glass at 37° C., as can be seen from Table IV.

It can be noted from Tables I to IV that the growth of diphtheria bacilli continued in broth, sometimes for a considerable period, after it failed to continue on serum, and

TABLE III.
Virulent Strain Number 2,425.

Days of Drying.	Results of Incubation.	
	Serum.	Broth.
1	Heavy growth.	Growth.
3	Heavy growth.	Growth.
6	Heavy growth.	Growth.
9	Moderately heavy growth.	Growth.
10	Eight colonies.	Growth.
14	No growth.	Growth.
16	No growth.	Growth.
17	No growth.	Growth.
20	No growth.	Growth.
22	No growth.	Growth.
24	No growth.	Growth.
27	No growth.	Growth.
29	No growth.	Growth.
30	No growth.	No growth.

this fact emphasized the importance of inoculating swab-sticks in nutrient broth after the inoculation on serum had been made. In some cases it was necessary to keep broth in the incubator up to seventy-two hours before growth became evident.

TABLE IV.
Avirulent Strain Number 689.

Days of Drying.	Results of Incubation.	
	Serum.	Broth.
1	Heavy growth.	Growth.
2	Heavy growth.	Growth.
4	Heavy growth.	Growth.
6	Moderately heavy growth.	Growth.
8	Nine colonies.	Growth.
10	Three colonies.	Growth.
11	No growth.	Growth.
12	No growth.	Growth.
13	No growth.	Growth.
14	No growth.	Growth.
15	No growth.	No growth.

In Table V the resistance of all 45 strains to drying on glass at 37° C. is presented. The average resistance for virulent strains was 19 days, and that for avirulent strains was 10 days.

TABLE V.
Number of Strains in Relation to the Number of Days of Drying.

Days of Drying.	Virulent Strains.	Avirulent Strains.
5	0	2
6	1	0
8	0	2
10	0	7
11	0	5
12	0	3
14	2	1
16	8	0
20	6	0
21	1	0
23	4	0
25	1	0
29	1	0
37	1	0
Total ..	25	20

The Variation in Resistance to Drying of Bacilli on Separate Films of a Given Culture.

If separate films of a given culture are tested for their resistance to drying, it will be found that they vary little from one another. They exhibit an astonishing consistency in this characteristic.

Five strains, three virulent and two avirulent, were selected for this experiment. Three sets of smears were made simultaneously from each strain in the manner already described. The results can be seen from Table VI.

TABLE VI.
Resistance to Drying (in Days).

Strain Number.	Virulent or Avirulent.	Sets.			Average. (Days.)
		I.	II.	III.	
1	Virulent.	20	22	22	21·3
2	Virulent.	14	15	12	13·7
3	Virulent.	23	21	22	22·0
4	Avirulent.	13	15	12	13·3
5	Avirulent.	10	11	11	10·7

Similar experiments were repeated with individual colonies of two virulent strains. Strains 1 and 3 (Table VI) were plated on Löffler serum. After incubation at 37° C. for twenty-four hours five colonies from each plate were picked off and inoculated individually on Löffler serum slopes. Slopes were incubated for twenty-four hours and a set of smears was made for each individual inoculated slope.

Table VII shows the number of days during which diphtheria bacilli remained alive.

TABLE VII.
Resistance to Drying (in Days).

Strain Number.	Colonies.					Average of Group of Colonies.	Average of the Original Strain (Table VI).
	1	2	3	4	5		
1	20	23	21	24	21	21·8	21·3
3	19	22	21	23	22	21·4	22·0

It appears, therefore, that the degree of resistance to drying on glass at 37° C., exhibited by different strains, was a rather constant factor for the original strains. It can be seen also from Table VII that the number of days of resistance for individual colonies was almost identical with the period observed for the original corresponding strain.

Acquired Resistance to Drying.

Table V shows that different strains of diphtheria bacilli (both virulent and avirulent) exhibit different degrees of resistance and that a difference of 31 days was observed between two virulent strains. Another question is whether daughter strains become more resistant than their respective parent cultures.

Numerous experiments show that under laboratory conditions diphtheria bacilli acquire a considerable degree of resistance to drying at 37° C. and that each subsequent daughter strain acquires a higher degree of resistance than does its respective parent strain.

In Tables VIII to XI the resistance of four selected strains is recorded. From these tables it can be seen that

TABLE VIII.
Virulent Strain V23.[1]

Strain.	Survived Drying. (Number of Days.)	Increase. (Days.)	Interval between Experiments. (Days.)	Virulence.
V ..	23	—	—	+
V23 ..	52	29	20	+

[1] V = Original strain; V23 = strain recovered from original after drying for twenty-three days.

different strains of diphtheria bacilli exhibit their individual characteristics in acquiring resistance to drying. In some strains, like V23 and AV8, the degree of resistance is increased very quickly; in others, like V6, rather slowly.

From the same tables (VIII to XI) it can be seen that all "daughter" strains of virulent "original" strains remained virulent, that those of avirulent strains remain avirulent, and that no transformation of an avirulent strain into a virulent strain or *vice versa* occurred through the increase of the degree of resistance to drying.

TABLE IX.
Virulent Strain V6.[1]

Strain.	Survived Drying. (Number of Days.)	Increase. (Days.)	Interval between Experiments. (Days.)	Virulence.
V ..	6	—	—	+
V6 ..	8	2	6	+
V8 ..	10	2	5	+
V10 ..	17	7	25	+
V17 ..	21	4	14	+
V21 ..	22	1	7	+
V22 ..	24	2	14	+
V24 ..	50	26	45	+

[1] V = Original strain; V6 = strain recovered from original after drying for six days; V8 = strain recovered from strain V6 after drying for eight days; V10 = strain recovered from strain V8 after drying for ten days; and so on.

TABLE X.
Avirulent Strain AV8.[1]

Strain.	Survived Drying. (Number of Days.)	Increase. (Days.)	Interval between Experiments. (Days.)	Virulence
AV ..	8	—	—	—
AV8 ..	18	10	25	—
AV18 ..	41	23	25	—

[1] AV = Original strain; AV8 = strain recovered from original after drying for eight days; AV18 = strain recovered from AV8 after drying for eighteen days.

TABLE XI.
Avirulent Strain AV5.[1]

Strain.	Survived Drying. (Number of Days.)	Increase. (Days.)	Interval between Experiments. (Days.)	Virulence.
AV ..	5	—	—	—
AV5 ..	7	2	6	—
AV7 ..	11	4	16	—
AV11 ..	15	4	20	—
AV15 ..	33	18	40	—

[1] AV = Original strain; AV5 = strain recovered from original after drying for five days; AV7 = strain recovered from AV5 after drying for seven days; and so on.

Is the Acquired Resistance to Drying an Enduring Characteristic?

Quite a number of "daughter" strains were tested again and again after some intervals (up to eight months) and it was found that the acquired resistance to drying was an enduring characteristic, not affected by time.

The following experiments illustrate the point.

TABLE XII.

"Daughter" Strains.	Virulent or Avirulent.	Resistance to Drying. (Days.)	Interval Before Retesting. (Days.)	Resistance in Days on Retesting.	Increase. (Days.)
V21	Virulent.	21	75	25	4
V22	Virulent.	22	60	26	4
V17	Virulent.	17	235	34	17
704	Avirulent.	11	60	18	7

The cultures were kept on Löffler's serum slopes and in nutrient broth at the room temperature, in a dark cupboard. Twenty-four hour subcultures were used for experiments, as mentioned in Table XII. The acquired resistance to drying remained stable also after 12 repeated subcultures. After 20 repeated subcultures only a slight decrease in resistance could be noted. The result of experiments with four virulent strains can be seen from Table XIII.

TABLE XIII.

Strains.	Resistance to Drying. (Days.)	Resistance to Drying. (Days.)	
		After 12 Subcultures.	After 20 Subcultures.
"A"	10	11	10
"B"	17	17	15
"C"	25	24	21
"D"	37	37	35

Summary.

1. Different strains of diphtheria bacilli exhibit different degrees of resistance to drying.
2. The importance of inoculating swab-sticks in broth, when testing for viability, is discussed.
3. Separate colonies of a given culture exhibit an astonishing consistency in their resistance to drying.
4. Under laboratory conditions diphtheria bacilli can acquire a considerable degree of resistance to drying. It was found that each subsequent "daughter" strain acquired a higher degree of resistance than did its respective parent strain.
5. In no case was it found that an avirulent strain became virulent or *vice versa* through the increase of the degree of resistance to drying.
6. The acquired resistance to drying was an enduring characteristic not affected by time (up to eight months) or by 12 repeated subcultures. After 20 repeated subcultures only a slight decrease in resistance was noted.

Acknowledgements.

My thanks are due to the Director-General of Public Health, New South Wales, for permission to publish this paper. I am also grateful to Dr. C. W. Adey and Dr. F. G. Morgan (Commonwealth Serum Laboratories) and to Dr. E. L. Morgan, Principal Microbiologist, for their encouragement and helpful advice.

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OBSERVATIONS ON THE SENSITIVITY OF STAPHYLOCOCCI TO PENICILLIN.

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THE continued pathogenicity of staphylococci which have become resistant to penicillin is of interest epidemiologically and also from the point of view of treatment. As a result of the work of Abraham *et alii* (1941) it has been generally assumed that organisms with this acquired penicillin resistance retain their pathogenicity and may therefore be dangerous in situations where cross-infection can occur.

Spink, Ferris and Vivino (1944) compared the virulence of staphylococci with that of resistant variants developed from them by cultivation in penicillin broth. To test the organisms for virulence, they examined their resistance to the bactericidal action of defibrinated normal human blood. Their results indicated that penicillin-resistant strains were less virulent than the parent sensitive strains. They agreed, however, with the findings of Abraham *et alii* that a strain which had acquired resistance showed no fundamental change in biological or metabolic activities as compared with the parent, except that the rates at which these activities were carried out were slower for the resistant strain.

The present work was undertaken with a view to ascertaining whether the possession or absence of any of the commoner properties of staphylococci would show correlation with the degree of their sensitivity to penicillin.

Strains Examined.

One hundred and twenty-eight strains of staphylococci of known biological and metabolic characteristics, collected from various sources before the advent of penicillin treatment, were tested for penicillin resistance. They included strains from various lesions—osteomyelitis, carbuncles, furuncles *et cetera*—as well as others from healthy organs and tissues. Seventy of the strains had been tested for bacteriophage sensitivity with the four staphylococcal bacteriophages Au1, Au2, Au3 and Au4 used by Burnet and Lush (1935). Definite differences in sensitivity to bacteriophage action were found.

Thirty-one strains from hospital wards in which penicillin has been used extensively, particularly in local application to wounds, were also tested for resistance to penicillin. In addition, their biological and metabolic characteristics were compared with those of the 128 strains mentioned above.

A standard reference penicillin-sensitive strain (F.D.A. 209) and a known resistant strain (Crotty) were included as controls. Both of these strains came originally from America.

Technique.

Tests for hæmolysins (α, β and $\alpha\beta$) were made on 5% sheep blood-agar medium (Christie and North, 1941).

Tests for coagulase were made with human plasma diluted ten times with normal saline solution (Cruickshank, 1937), readings being made after four and after eighteen hours.

Fibrinolysin was detected on fibrinogen agar (Christie and Wilson, 1941).

Lipase production was detected on butter fat neutral red agar medium (Christie and Graydon, 1940).

Mouse pathogenicity was estimated as follows.

The organisms from an overnight agar slope culture were scraped off and added to normal saline solution. The suspension was standardized to 4,000,000,000 organisms per millilitre by means of Burroughs Wellcome standard opacity tubes. One millilitre of this suspension was injected intraperitoneally into each of five mice weighing 18 to 22 grammes.

Previous work with this inoculum and further trial tests with 18 pathogenic strains and 12 non-pathogenic strains had shown that if the strains were coagulase-producing and from a pathological source, the five mice would die within twenty-four hours, whereas if the strain did not produce coagulase and were from a non-pathological source, no mice would die.

Mannite fermentation was detected by the inoculation of mannite broth tubes, daily examination being made during incubation at 37° C.

Serological typing was carried out by means of Cowan's (1939) slide agglutination method.

Pigment formation was detected by cultivation of the organisms on milk-agar medium (Fujita and Yoshioka, 1938).

Penicillin sensitivity was estimated by the inoculation into ten-millilitre samples of nutrient broth containing different quantities of penicillin of one drop (from a fine-tipped Pasteur pipette delivering approximately 0·033 millilitre) of an overnight broth culture. The inoculated tubes were examined after twenty-four hours' incubation at 37° C. and the tube containing the minimum quantity of penicillin with no visible growth was noted. The stock penicillin solutions used were obtained direct from the penicillin assay department, and all dilutions were made with phosphate buffer solution. To ensure uniformity of penicillin concentration, bulk quantities of each penicillin broth were prepared and dispensed in quantities of ten millilitres in tubes.

Results.

Of the 128 strains from "non-penicillin" sources, 123 were inhibited by one-eighth of a unit or less of penicillin per millilitre, two were inhibited by one-quarter of a unit, and three were inhibited by half a unit (see Table I). The five strains showing slightly increased resistance were non-pathogenic. The series included strains known to vary in such properties as hæmolytic (α, β and $\alpha\beta$) power, ability to produce pigment, fibrinogen, lipase and coagulase, fermentation of carbohydrates (mannite, trehalose and mannose) and sensitivity to bacteriophage action, while nine serological types (Christie and Keogh, 1940) were represented. In spite of this variety in properties, sensitivity to penicillin did not vary appreciably from strain to strain.

Of the 31 strains from patients in penicillin treatment wards, 18 showed considerable resistance to the drug (see Table I). All were pathogenic, in that they produced coagulase, α toxin, fibrinogen and golden yellow pigment, and also they were found to be lethal for mice. All strains fermented mannite within two days, except two which required three days, these two being penicillin-sensitive.

In a further search for some property which might be influenced by penicillin treatment, the ability of these 31 strains to produce the enzyme phosphatase was examined. Bray and King's (1943) phenolphthalein phosphate medium was used. All 31 strains were found to give an equally strongly positive indication of phosphatase production.

It seemed possible that the resistant strains might have had a mixed population, part of which was responsible for growth in penicillin broth, while the remainder were pathogenic to mice. To test this, cultures from four resistant strains in penicillin broth were plated out on blood-agar medium. No hæmolytic variants were seen. Sub-cultures were made from single colonies from all four strains and tested for pathogenicity to mice by the above method. All gave positive results. Plate cultures from resistant strains made on blood-agar containing one-quarter of a unit of penicillin per millilitre showed as many colonies as similar cultures from the same strains on control plates without penicillin.

The possibility that all 18 resistant strains were from a common parent and that cross-infection from a single source had occurred was discounted when slide agglutination of the strains showed that at least three serological types were represented. The evidence, however, did not exclude the possibility that some cross-infection had occurred.

The results shown in Table I with the 119 pathogenic strains are represented graphically in Figure I, the number

TABLE I.

Comparison of Sensitivity of Staphylococci Collected Prior to the Use of Penicillin, with Staphylococci Isolated from Patients in a Hospital where Penicillin Treatment is Given.

Strains.	Minimum Inhibiting Concentration of Penicillin in Broth. (Units per Millilitre.)													Total.
	80	40	20	10	5	2½	1	½	¼	⅛	1/16	1/32	1/64	
Strains from non-penicillin sources:														
Coagulose-producing	0	0	0	0	0	0	0	0	0	53	30	5	0	88
Coagulose non-producing	0	0	0	0	0	0	0	3	2	3	26	6	0	40
Strains from hospital where penicillin was used (all coagulose-producing)	1	0	1	13	2	0	1	0	0	11	2	0	0	31
Total														159

of strains being shown along the ordinate and the inhibiting unitage of penicillin along the abscissa. The resulting graph, with its two maxima, suggests that staphylococci under the action of penicillin *in vivo* rapidly acquire resistance of a fairly constant degree (five to ten units), further resistance being much more slowly acquired. Efforts to confirm this *in vitro* were unsuccessful, the resistance having been found to increase steadily to a much higher degree.

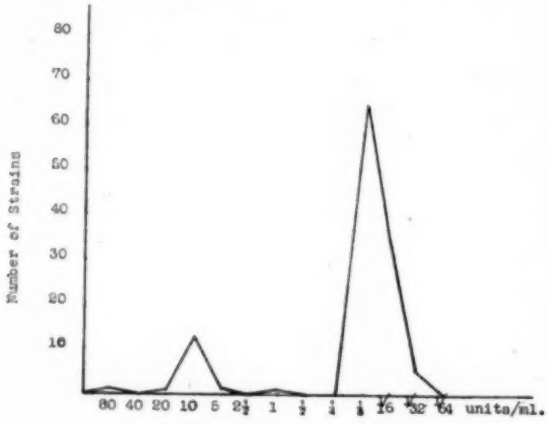

FIGURE I.

Graph connecting number of strains of staphylococci with minimum unitage of penicillin that will inhibit growth in broth. (Staphylococci not producing coagulase are not included.)

Discussion.

The finding of such a large proportion of penicillin-resistant strains (17 of 31 strains being resistant to 2·5 or more units of penicillin per millilitre) in cultures received from penicillin-treated lesions was unexpected. The contrast between this group and the group of 88 coagulase-producing strains from the original collection (no strain was resistant to more than one-sixteenth of a unit per millilitre) is striking.

It is clear that naturally occurring penicillin-resistant pathogenic staphylococci are uncommon; it would seem equally clear that a large proportion of resistant strains—pathogenic, by the usual criteria of pathogenicity—may appear in wounds in wards where penicillin is used intensively and over long periods of time.

No difference in the rate of biological or metabolic activities of the penicillin-resistant as compared with penicillin-sensitive strains was found. However, we have not yet compared a resistant strain developed in the test tube with the parent culture, as has been done by Abraham *et alii* and by Spink, Ferris and Vivino. It does not necessarily follow that changes induced *in vitro* will develop *in vivo*.

To reiterate, our only definite findings are that a highly significant proportion of penicillin-resistant staphylococci have been obtained from lesions of patients in wards in which penicillin treatment has been given. It is not known whether these resistant strains develop mainly from sensitive parent organisms in the same wound or are the result of cross-infection, either from carriers or air-borne. Further, from this preliminary study it has not been possible to determine to what extent these resistant strains have delayed the sterilization and healing of wounds.

Further work is necessary and is being done to determine the importance of these preliminary findings from the aspects of epidemiology and prognosis.

Summary.

In an examination of 159 strains of staphylococci no correlation was found between resistance to penicillin and other biochemical properties.

The only strains showing resistance to penicillin came from patients in wards in which penicillin treatment had been given. These strains showed no differences in common properties from normal strains.

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ADMINISTRATION OF PENICILLIN BY CONTINUED IMPLANTATION OF THE NEEDLE.

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IN the *British Medical Journal* of January 27, 1945, H. L. Milles describes a means of giving penicillin without the necessity of the three-hourly puncture, which proves such a sore trial to many patients. Milles does this basically by leaving the needle *in situ* in the lateral aspect of the gluteal region. With a slightly more elaborate piece of apparatus penicillin can be given in a site which allows the patient to turn on his side without lying on the needle, and with the minimum of disturbance to the patient.

The apparatus (Figure I) consists of the following sections: (i) an intramuscular injection needle; (ii) two rubber tubing adapters, male "Record" (or, if available, one should be "Luer-lok"); (iii) a piece of rubber tubing three inches long (one-quarter inch outside diameter); (iv) a rubber bung to fit a five-eighth inch test tube; (v) a five-eighth inch test tube, cut two inches from the lower end and with edges smoothed; (vi) a small rubber tube clamp; (vii) an aspirating needle (standard wire gauge 15) cut off one and a quarter inches above the butt.

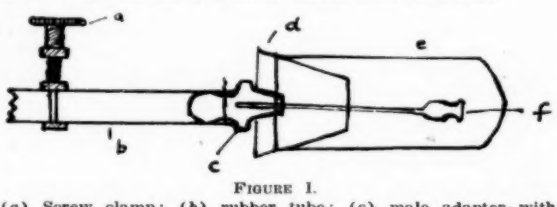

FIGURE I.

(*a*) Screw clamp; (*b*) rubber tube; (*c*) male adapter with soldered joint; (*d*) rubber bung; (*e*) glass tube; (*f*) aspirating needle.

The apparatus is assembled as follows. The cut-off needle is forced through the bung from the narrow diameter side, fitted into the adapter and soldered in position. Both

adapters are then wired into the rubber tubing (a substitute "Luer-lok" adapter is illustrated in Figure II). The apparatus is connected to an intramuscular injection needle sunk rather obliquely into the front of the thigh and pointing upwards. The skin, of course, should be adequately prepared beforehand. Adhesive plaster over the hub of the intramuscular injection needle and the rubber bung keeps the apparatus in place, while the glass tube is cushioned on a small gauze pad.

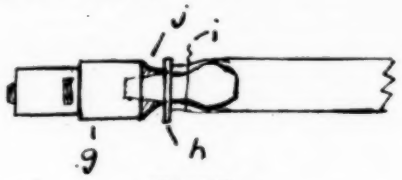

FIGURE II.
Substitute "Luer-lok" adapter for use with the "Luer-lok" intramuscular injection needle: (*g*) "Luer-lok" fitting from a broken syringe; (*h*) male rubber tubing adapter ("Record"); (*i*) wire; (*j*) solder.

At each penicillin administration the glass tube is removed, the filled syringe is fitted to the needle butt, and the clamp is unscrewed. Following delivery the clamp is screwed up and the glass is replaced. The capacity of the apparatus is approximately 1·4 cubic centimetres, and hence allowance should be made for this at the first dose. No deterioration of the drug takes place owing to contact with the rubber tubing, and the whole can be left *in situ* for up to three days if necessary.

Acknowledgements.

My thanks are due to Dr. Vickers, of the pathology department, for his suggestions, to Messrs. A. Heyde and A. Lockhead for their technical assistance, and to the Medical Superintendent of the hospital for permission to publish this article.

Reports of Cases.

CHRONIC MENINGOCOCCAL SEPTICÆMIA.

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ALTHOUGH chronic meningococcal septicæmia was first described in 1902 by Soloman,[1] and although over 100 cases have been reported in European literature, fewer having been reported in America and British journals, the diagnosis is frequently overlooked. This is partly due to the dramatic rapidity with which the condition is cured by sulphonamide therapy: in most cases all manifestations disappear within twenty-four hours of the commencement of treatment. Since full investigations of many febrile patients, especially in private practice, are carried out only after sulphonamides have failed to cure the condition, culture of microorganisms from the blood is seldom attempted in this disease. Repeated attempts at culture, preferably during a febrile period, may be necessary to confirm the diagnosis, although the clinical picture is usually sufficiently characteristic to enable a fairly certain diagnosis to be made.

The patient, usually a young adult, presents himself with a history of an acute, less often insidious, onset of intermittent fever or of regular or irregular bouts of pyrexia over the preceding two or more weeks, often accompanied by shivering and sweats, headache, malaise, anorexia and other symptoms. If untreated, the fever may persist for months. Flitting pain in muscles and joints is characteristic, though examination may fail to reveal much evidence of involvement of joints; the condition is often one of arthralgia.

The chief diagnostic feature is the rash, often petechial, but frequently appearing as pink or red macules, papules and nodules, which may be tender and in many cases bear a close resemblance in appearance, though not necessarily in distribution, to the lesions of *erythema nodosum*. The rash usually appears within a few days of the onset; successive crops lasting a few days are seen.

Other features are the relatively slow pulse rates in proportion to the temperature and the remarkably good general condition of the patient despite the prolonged fever. A polymorphonuclear leucocytosis is usually present.

Acute infective endocarditis, nephritis, acute epididymitis and meningitis may follow in due course if the patient does not receive appropriate treatment.

The condition is frequently diagnosed as influenza, arthritis, rheumatic fever, rheumatism, trench fever or *erythema nodosum*.

In 1938 Dimson[2] reported the first case in which sulphapyridine treatment was given, and emphasized its superiority in this disease over sulphanilamide, the use of which had been recorded in 1937 by Schwentker and his colleagues[3] and by Zendel and Greenberg.[4] More recently Stott and Copeman[5] and Dickson and his colleagues[6] have reported groups of these cases occurring during epidemics of cerebrospinal fever. Lane[7] recorded a case in this journal last year almost identical with the one to be described below. In his case the intervals between the pyrexial bouts were forty-eight hours; in the present case the intervals were seventy-two hours.

Clinical Record.

K.F., a Chinese, aged thirty-two years, addicted to smoking opium, was admitted to the Royal Melbourne Hospital on November 15, 1944. There was nothing of note in his past history. He had been perfectly well until four weeks previously, when he noticed the sudden onset of flitting pain in various joints—the knees, elbows, wrists and fingers—and a numb feeling in the ankles. The pain had been present intermittently since then. Malaise and anorexia with occasional shivering and sweats were also noted. He had been excessively thirsty for a few days and had diarrhœa on the day of his admission to hospital.

On examination of the patient, the temperature was 101·8° F. and the pulse rate 80 per minute. Joint movements were full and caused little discomfort. Several small raised erythematous nodules on the right forearm rather resembled the lesions of *erythema nodosum*. A trace of albumin was present in the urine, which appeared normal on microscopic examination. The clinical findings were otherwise normal. Before sulphonamides were given, four periods of fever each lasting for twenty-four hours, with afebrile intervals of almost exactly seventy-two hours between each phase, were observed.

A blood count gave the following information: the hæmoglobin value was 108% (15·1 grammes per 100 cubic centimetres), the erythrocytes numbered 5,800,000 per cubic millimetre, and the leucocytes numbered 22,000 per cubic millimetre. The differential leucocyte count revealed a relative and absolute neutrophilia with a "shift to the left" in the neutrophile count. No malarial parasites were seen. Negative results were obtained to the gonococcal complement fixation test, to the Wassermann test applied to the serum, and to the agglutination test for *Brucella abortus* infection.

Blood was taken for cultural examination on November 20, when the patient was afebrile, and next day during a febrile phase, and during the interval before the results were known, sodium salicylate was given for several days without benefit. Meningococci, type I, were isolated from the second attempt at culture; no growth was obtained from the first attempt. This illustrates the value of taking blood for cultural examination during febrile periods.

On November 28, a course of sulphapyridine treatment was commenced with an initial dose of four grammes, followed by one gramme every four hours. The patient became afebrile within twenty-four hours. Skin lesions and joint symptoms disappeared. The leucocyte count dropped to 9,500 per cubic millimetre on November 30. He remained well until his discharge from hospital on December 12.

Comment.

The chief interest of this case was the regular periodicity of the fever, a feature also present in the case reported by Lane.[7] This may be helpful in diagnosis, though more often the bouts of fever come at irregular intervals. The patient also presented the characteristic picture which enables a presumptive clinical diagnosis of chronic meningococcal septicæmia to be made, the chief features being the good general condition despite prolonged fever, the flitting pain in muscles and joints and the typical rash. He also showed the usual dramatic response to sulphonamide therapy.

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(7) J. Lane: "Chronic Meningococcæmia", THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, December 9, 1944, page 617.

A CASE OF MULTIPLE INJURIES.

By H. B. HOLMES,

Surgeon Lieutenant, Royal Australian Naval Reserve.

THIS case is described partly because of the multiplicity of the injuries concerned, but more particularly to show a method of suspension which has the merit of being easy and effective. It met with the unqualified approval of the nursing staff.

Clinical Record.

L.A.H., aged thirty-four years, was employed as an engine room artificer on a floating dock. On the morning of August 23, 1944, he was found lying on the platform which formed the floor of the dock, and had apparently fallen from the top of the dock some hours previously. When found he was still conscious and suffering from an obvious fracture of the right humerus and a compound fracture of the right elbow joint. His other injuries were not obvious on routine inspection at the time and place.

It was an hour later by the time he was put into a boat, transported ashore and brought to hospital. On his admission to hospital, he was pale and suffering from shock; he complained of pain in the small of the back and down his left leg, as well as of the uselessness and pain of his right arm. His temperature was 96·4° F., his pulse rate was 80 per minute, and his respirations numbered 24 per minute. The blood pressure was 96 millimetres of mercury, systolic, and 66, diastolic. There was an obvious deformity of the mid-shaft of his right humerus, and a small puncture wound over his right olecranon process was bleeding freely. Tenderness was present for the full length of the lumbar part of his spine, and he resented any attempt to move his left leg, although the limb itself seemed intact and had lost all sensation over the distribution of his left peroneal nerve. No attempt was made to test the integrity of his pelvis.

Anti-shock measures proved effective without intravenous therapy, and his condition improved rapidly. His arm, the lumbar part of his spine, and his pelvis were radiologically examined *en route* to the operating theatre. The radiologist reported the following fractures: (i) a transverse fracture of the mid-shaft of the right humerus with angulation at the fracture site; (ii) comminuted fractures of the right olecranon and external condyle of the right humerus, with separation of the fragments; (iii) fractures of the transverse processes of the second, third and fourth lumbar vertebræ; (iv) fractures of both ischial rami; (v) fractures through both acetabula and the left sacro-iliac joint; (vi) dislocation of the *symphysis pubis* and the right sacro-iliac joint; (vii) fracture of the articular process of the third lumbar vertebra.

Under ethyl chloride and ether anæsthesia, the wound over his olecranon was excised, the bleeding vessels were tied, loose bone fragments were removed, and the elbow joint was washed out with saline solution. The remaining fragments of the olecranon were sutured with chromicized gut. The wound was dusted with sulphanilamide powder and sutured. After manipulation of the humerus, the arm was enclosed in plaster, the elbow joint being at an agle of 135°. A Thomas splint (straight) with strapping extension was applied to both legs, fifteen pounds traction being used. A firm binder was applied to his pelvis.

The hæmoglobin value of his blood after his return from the operating theatre was 90%, and the erythrocytes numbered 4,000,000 per cubic millimetre. His urine contained old blood in all specimens for several days, but no fresh hæmorrhage of any amount occurred. He was given penicillin intramuscularly, a total dosage of 100,000 units per day for four days, and remained afebrile. His pulse rate remained below 100 per minute throughout his illness. The hæmoglobin value dropped during the following three days to 70%, where it remained constant, the erythrocytes numbering 3,400,000 per cubic millimetre, although there was no sign of external or intraabdominal hæmorrhage.

His condition remained unchanged, except that he was proving difficult to nurse, as any attempt to move him caused him to complain bitterly and the simplest procedure left him exhausted. The peroneal palsy persisted, and small pressure sores appeared on his buttocks. To ease this nursing problem, he was anæsthetized with "Pentothal Sodium" on September 1, and a double hip spica was applied. In this he was much more comfortable, and the nursing was simplified.

On September 6 the hæmoglobin value was 70% and the erythrocytes numbered 3,500,000 per cubic centimetre; he was given 800 cubic centimetres of fresh blood by slow drip through a needle. His general condition improved rapidly. On September 23 his plaster arm splint was changed. The wound was healed and he had about 35° of movement in his elbow joint. The humerus fracture was clinically firm, although X-ray examination still showed the fracture line, with good callus formation. The peroneal palsy had not altered, and he had paralysis of his peroneal muscles and the long extensors of the toes, with anæsthesia of the lateral aspect of his left foot.

FIGURE I.

On September 28 he was put in a new hip spica, the technique of R. Watson-Jones being used; the patient was laid on his side on a pelvic rest, and the plaster was applied in this position, the gap being filled in later. This was surprisingly easy. Two days later he had sensation in his left foot for the first time since the accident, and a slight recovery was noticed in the muscle power of the affected muscles.

He was dispatched south by air on October 7 to hospital in Sydney. The only late information I have on his progress is from a letter from the man concerned, informing me that he is walking with the aid of a stick, but that his paralysis has not completely recovered.

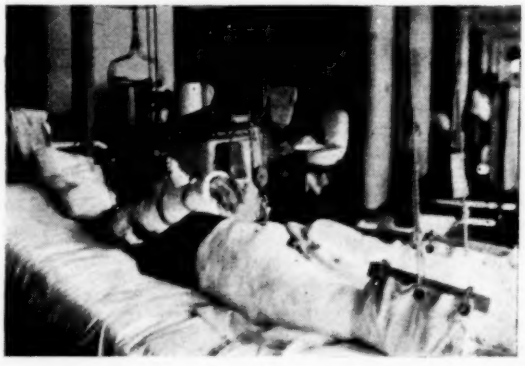

FIGURE II.

While the patient was nursed in extension, the services of at least three persons were necessary to carry out ordinary nursing duties, two to lift the patient and one to perform

the chores. In addition he suffered a good deal of pain, and at the conclusion of a natural function he was exhausted. After the application of the double hip spica on September 1, four people were required to lift him and wash him, as he was unable to help himself much with his right arm in a plaster splint. At the time the plaster was applied, a steel plate (Figure I), measuring about six inches by four inches, made of one-quarter inch steel and having a ring one inch in diameter welded to it, slightly curved to fit his abdomen, and held by a broad canvas band, was incorporated in the plaster. After the plaster had set, the patient was literally counterpoised (Figure II). Each leg was slung in a canvas sling and counterpoised by a ten pound weight over a pulley attached to the beam of a Balkan frame. His right arm, which was still in plaster, was slung in similar fashion, but a five pound weight only was needed. This enabled him to move his shoulder against mild resistance, and kept his shoulder-girdle musculature in good tone.

To the ring protruding from the abdominal portion of the plaster spica, the lower double block of a four-strand double purchase tackle was hooked, while the upper block was attached to the overhead beam of a Balkan frame. The weight used was twenty pounds; this gave an actual lift of eighty pounds on the plate in the plaster. This lifted him so that a pressure against the bed was nominal, and the push of a hand was enough to lift him clear of the bed. One person was sufficient to help him with ordinary functions, and two could wash him easily. The patient was delighted with the contrivance and cooperated well.

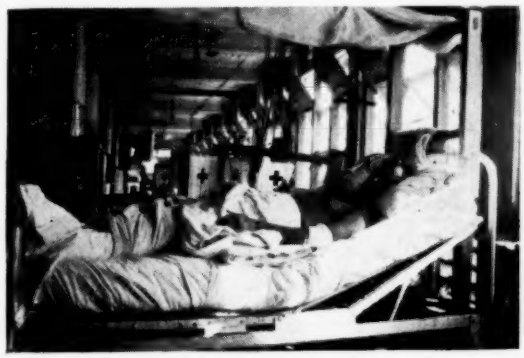

FIGURE III.

Conclusion.

A case of multiple injuries is described with the treatment adopted. A simple and effective method of slinging a patient in a double hip spica with arm and back injuries is described in detail. The success of this method from the nursing standpoint was undoubted.

Acknowledgements.

My thanks are due to Major L. A. Wilson, Australian Army Medical Corps, for his advice, to Lieutenant L. Barr (physiotherapist) for her help and cooperation, and to Surgeon Captain W. J. Carr, Director of Naval Medical Services, for permission to publish this case.

UNILATERAL URETERIC OBSTRUCTION FROM SULPHONAMIDE CRYSTALS.

By N. R. WYNDHAM,

Lieutenant-Colonel, Australian Army Medical Corps, Australia.

CERTAIN precautions must always be taken when sulphonamides are being administered, especially sulphathiazole, sulphadiazine and sulphamerazine. These two cases are recorded because they show that obstruction may be present even though symptoms and signs are minimal. They also serve to support the finding that the common site of obstruction in sulphamerazine crystalluria is the lower end of the ureter.

Case I.

Private A.J.S. was admitted to hospital with renal symptoms, which had manifested themselves during treatment for non-specific urethritis. He had had sixteen tablets (eight grammes) of sulphamerazine during the forty-eight hours prior to the onset of symptoms, which roughly corresponded to the time of his admission to hospital. He complained of lower abdominal pain and discomfort, especially on the left side. This was boring in character and went through to the left loin and necessitated the use of morphine. He had passed small amounts of urine during the day without dysuria.

On examination of the patient, his general condition was good; but tenderness was present over the lower part of the abdomen and the left kidney posteriorly. There were no other physical findings of importance. He passed eight ounces of urine soon after his admission to hospital. This was neutral in reaction, and the only abnormality found was eight to twelve red blood cells per high-power field. No crystals were present. He was treated by the administration of copious fluids and alkalis by mouth and intravenously, whereby the volume of his urine was increased and its reaction was made alkaline. Despite this, he was not entirely free from tenderness two days later. A cystoscopic examination was indicated.

The cystoscopic examination showed that the bladder was normal. The right ureteric orifice was normal and was catheterized readily; urine was quickly recovered from the right ureteric catheter. The left ureteric orifice was red and œdematous; no abnormal substance could be seen near the opening. The ureter was catheterized with difficulty, an obstruction being present about three-quarters of an inch from the bladder opening. This was overcome only by irrigating the ureter with a warm 1% solution of sodium bicarbonate; crystalline debris was washed out. Eventually the catheter could be passed up the full length of the ureter, but no urine came from that kidney. The kidney did not function for over twelve hours. Subsequent convalescence was uneventful apart from a transient infection.

Case II.

Major M.A.E. had had a boil in the ear, for which thirty tablets of sulphamerazine had been given during the forty-eight hours prior to the onset of symptoms. He awoke with a severe pain in the lower part of the abdomen, which moved to the right loin. Soon afterwards he passed a small amount of urine which caused a burning pain in the urethra. He passed two drachms of urine during the next few hours and had a constant desire to micturate and defæcate. He vomited frequently.

On his admission to hospital he looked ill. His tongue was dry and coated and his breath was offensive. Tenderness was present over the abdomen, especially in the region of the right kidney, and muscle guarding was observed. His bladder was not tender. He was treated by the usual general methods—namely, the administration of copious fluids by mouth and intravenously and of alkalis by both routes. Within a few hours he passed a good volume of urine containing a few crystals. Three days later he was free of all symptoms except a little pain in the distribution of the right ureter, where tenderness was present. He was passing plenty of urine, which was alkaline and contained neither red blood cells nor crystals. Despite his improvement it was decided to perform a cystoscopic examination.

This was carried out by Major R. Silverton. The bladder mucosa was found to be normal. The left ureteric orifice was normal, and the left ureter was catheterized easily and a good concentration of indigo-carmine dye was present in the urine from this side five minutes after injection. The right ureteric orifice was entirely blocked by brownish crystalline debris, and no dye appeared at this opening. The crystalline obstruction was carefully washed away with 1% sodium bicarbonate solution, and a catheter was eventually passed. There was immediate relief of symptoms, though no urine came from the right kidney for some hours. The right ureter was washed out every hour with three cubic centimetres of sodium bicarbonate solution. Three days later the urine was still blood-stained, but a satisfactory volume of urine was being passed and the catheter was removed.

Acknowledgement.

Appreciation is expressed for the permission of the Director-General of Medical Services to publish notes of these cases.

Reviews.

A HANDBOOK OF PRACTICAL BACTERIOLOGY.

THE seventh edition of Mackie and McCartney's "Handbook of Practical Bacteriology", and its second wartime revision, abundantly fulfils the promise in the subtitle of a guide to bacteriological laboratory work.[1] The technical routine of hospital and public health bacteriological laboratories might well be based entirely on this manual, for only a most bizarre investigation or the ultimate in exotic culture medium would find it wanting. The book is, however, much more than a compendium of technique, and covering as it does the whole field of medical bacteriology and laboratory diagnosis in concisely systematized manner, is particularly well adapted to the needs of senior students and medical graduates who retain their interest in laboratory work.

In the seventh edition there is no departure from the general plan of that of 1942. Most of the new matter is to be found in the appendix, the authors having found an extension of this feature of the sixth edition to be the most convenient way of bringing the book abreast of the times. Prominent in the appendix is an informative chapter on the mode of action of the sulphonamide compounds, in connexion with which relevant aspects of bacterial nutrition are discussed, and in this section of the book will also be found consideration of antibiotic derivatives of fungi and bacteria, with special reference to penicillin. As befits such an essentially practical book, details of simple, yet sufficient, methods for determining the sulphonamide and penicillin sensitivity of pathogenic microorganisms are included, and that important measure of laboratory control, the penicillin assay of the blood serum, is not overlooked. The bacteriological examination of infected wounds, directed particularly to the detection of sporing anaerobes, is the subject of another valuable addendum.

We find it difficult to suggest any omission, and it is in no sense an over-statement of the merit of this book to say that the laboratory which does not possess an up-to-date copy of "Mackie and McCartney" lacks an essential item of equipment.

IMMUNOCHEMISTRY.

SINCE 1933, when Landsteiner published his monograph, "The Specificity of Serological Reactions", there has been a considerable increase in the research activity in this field of biochemistry. J. R. Marrack's article in the *Ergebnisse der Enzymforschung* in 1938 and his Special Report to the Medical Research Council of Great Britain in 1938 on the chemistry of antigens were pointers. A very important contribution to the literature has been made this year in the form of a treatise entitled "Immunocatalysis", written by Dr. M. G. Sevag.[2] The author, formerly a European and well known for his research into the respiratory mechanisms of pathogenic bacteria, is now assistant professor of biochemistry in bacteriology in the department of bacteriology of the school of medicine at the University of Pennsylvania.

This book is written for both teachers and investigators in bacteriology, pharmacology and immunochemistry. The following list of headings indicates the approach to the biochemical implications of immune reactions: "The Formation and Properties of Antibodies", "The Role of Catalysis in Chemical Reactions and its Bearing on the Formation of Antibodies", "The Mechanism of Antibody Formation", "The Nature of the Analogy between Immune and Enzyme Reactions", "The Formation of Specific Inhibitors in Enzyme Reactions", "Analysis of Certain 'Controversial' Aspects of Anti-Enzyme Immunity", "Antibodies against Various Enzymes", "Antibody against the Enzymes of Snake Venom", "Enzymatic Activities of Bacterial Toxins", "Bacterial Hæmolysins", "Hyaluronidase or the Permeability Factor", "Antibody against Bacterial Carbohydrases and Proteinases", "Antibody Formation against Respiratory Enzymes".

As the author states in retrospect: "This treatise comprises an integration of fundamental aspects of immune reactions and of enzyme reactions, under the theory of 'immunocatalysis'. This integration reveals that antigenic proteins manifest properties which satisfy the well-known criteria of catalysis, and that specific antibodies formed as final reaction products in response to antigenic stimuli fulfil the function of specific inhibitors of enzymes." In the last seven years the greatest stimuli to research in this field of biochemistry have come from the revision of the criteria of purity in large molecules following the crystallization of enzymes, and the progress in the purification of proteins and other large molecules of biological origin. Dr. Sevag has given a very concise account of what is known of the serological properties of the plant and animal products which, so far, have been purified or obtained in crystalline form. The concept of anti-enzymes and anti-enzyme immunity has been critically examined. There is assembled the main evidence for the conclusion that all proteins, as they occur naturally, whether they are antigens, enzymes, hormones *et cetera*, are catalysts. From this point of view he then examines the properties of antibodies and considers them as characteristic products of catalysed reactions. The conclusions can be condensed into a statement made on page 225: "In the *in vivo* mechanism the following pairs have the same roles: (*a*) antigen and enzyme, (*b*) globulin factors and substrate, and (*c*) antibodies and reaction products."

The bacterial enzymes and other bacterial products are considered separately and in great detail, this being Dr. Sevag's special interest. This section of the book includes the recent work on hyaluronidase, the permeability factor, and an extensive review of the enzymatic reactions of the toxins produced by species of the genus *Clostridium*. The volume concludes with a section devoted to the subject of the production of antibodies against the respiratory enzymes, a class of enzyme which has not yet been fitted so comfortably into Dr. Sevag's theory of immunocatalysis.

A book which represents an endeavour to consider critically the above-mentioned matters in 280 pages is certain to disappoint some advanced students of immunology and biochemistry who will wish to have the emphasis redistributed differently. However, we recommend this book strongly to all who wish to know what is happening on the advancing edge of immunochemistry.

The bibliography of five hundred references is very representative of what is best in this borderland subject. The author explains that Russian, Chinese, Italian and Japanese literature was not available to him. However, we have been unable to find any evidence that Dr. Sevag had read the recent monograph, "The Production of Antibodies", by F. M. Burnet *et alii* (1941). The very quiet reception given to this monograph in North America has been the subject of comment in a journal which arrived here recently. Admittedly the work of Dr. Kellaway and his co-workers is considered in other connexions and the references are listed.

The book is well indexed and well produced.

PSYCHOLOGY AND PSYCHOTHERAPY.

THE fifth edition of "Psychology and Psychotherapy" by Dr. William Brown contains sections on neuroses in wartime which should render it of assistance to many nowadays. Dr. Brown is eclectic in his psychology, a fact which constitutes a practical advantage, since this is a time when symptomatic treatment is required rather than ætiological research. His eclecticism extends to hypnotism, which has gone out of fashion following Freud's discoveries in the field of causation through the jettisoning of this method of treating symptoms. William Brown belongs to the generation of psychotherapists who learned from experience the value of hypnosis in symptomatic treatment; and, unlike some would-be modern psychologists who practise suggestion unawares, he has not thrown away the soap with the bath-water, even though he is far from certain what should be done to prevent the baby from getting dirty.

Dr. Brown describes the technique of hypnosis as applied to neurotic patients, particularly to those treated by him during the last war. In addition, he gives details of other methods of psychotherapy, usually from a distinctly individual point of view. More than this, he writes interestingly on many subjects (such as German mentality); and includes an appendix in which a medical practitioner who has undergone treatment from Dr. Brown supplies a commentary on his experience.

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[1] "Handbook of Practical Bacteriology: A Guide to Bacteriological Laboratory Work", by T. J. Mackie, M.D., D.P.H., and J. E. McCartney, M.D., D.Sc.; Sixth Edition; 1942. Edinburgh: E. and S. Livingstone. Crown 8vo, pp. 488, with illustrations. Price: 17s. 6d. net.

[2] "Immuno-Catalysis", by M. G. Sevag, Ph.D., with a preface by Stuart Mudd, M.A., M.D.; 1945. Springfield: Charles C. Thomas. 9" × 6", pp. 284. Price: $4.50, post paid.

[1] "Psychology and Psychotherapy", by William Brown, D.M. (Oxon.), D.Sc. (Lond.), F.R.C.P.; 1944. London: Edward Arnold and Company. 8½" × 5½", pp. 223. Price: 14s. net.

The Medical Journal of Australia

SATURDAY, JULY 14, 1945.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE LIQUOR TRAFFIC AND THE NEED FOR REFORM.

THERE must be few persons who will dissent from the view that the excessive consumption of alcoholic beverages is one of the greatest evils from which society today is suffering. Most people will therefore agree that reform of the liquor traffic is long overdue. According to the figures set out in the "Official Year Book of the Commonwealth of Australia", during 1938-1939, the year before the outbreak of war, the consumption of intoxicants per head of the population was: spirits, 0·22 imperial gallon; wine, 0·36 imperial gallon; beer, 12·13 imperial gallons. Immediately beneath the table in which these figures are set out, there appear the following remarkable sentences.

> Though the problem of the correct method of dealing with dipsomania is by no means an easy one, it seems fairly clear that the present plan of bringing offenders before magistrates, and subjecting them to the penalty of imprisonment or fine, has little deterrent effect, as the same offenders are constantly reappearing before the courts. Further, the casting of an inebriate into prison and placing him in his weakened state in the company of professional malefactors certainly lowers his self-respect, and doubtless tends to swell the ranks of criminals. Examination of the prison records in New South Wales some years ago disclosed the fact that over 40 per cent. of the gaol population had commenced their criminal career with a charge of drunkenness.

This is the kind of statement that might lead a casual reader to suppose that, in the face of such a regrettable state of affairs, something would be done to effect a change. Such a supposition would be completely foolish. The statement makes pious reading, and that is all that can be said about it, since reference to the earliest available "Official Year Book", that for 1915, shows that exactly the same words appear in that volume. Australia knows what is happening, but will do nothing. In these circumstances we propose to set out shortly some of the main features of the problem, in other words to proclaim the obvious, and secondly, to show that serious attempts are being made in at least one State of the Commonwealth to awaken public opinion, in short to declare facts that are not widely known.

The problem of alcoholism is not the problem of the common-sense person who takes a drink at meals or just before a meal or even on occasions at a social gathering. This person has no real problem; he does not allow the drinking of alcohol to interfere with his efficiency as an individual or as a member of a social unit. His self-discipline is complete and his work does not suffer. The problem arises when drinking is carried to excess and a habit is formed that may eventually lead to chronic alcoholism. That the taking of alcohol will interfere with ability to work is known to every medical practitioner, for he sees examples among patients in every walk of life and among women as well as men. It is known, too, by every person who has learned the truth by his own experience, as well as by those who have to work or live with him. Under the influence of alcohol skilled movements are done less acurately than they would otherwise be done and their coordination is not what it should be. Mental concentration, and attention as well as ability to think clearly, are impaired. In addition to these facts the emotional effect engendered by alcohol must be remembered; the banishment of "dull care" may be welcome to the drinker, but it is likely to bring trouble to him and others. All this has been discussed on previous occasions in regard to the driving of motor-cars "while under the influence". Everyone knows that some persons are more susceptible to alcohol than others; none are immune from its effects, but others are said to be able to "carry" their liquor. This brings us to the question of chronic alcoholism. The effects of long-continued alcoholism on the body are widespread. In the long run all the vital organs, including the central nervous system, are affected; as D. B. Rotman has recently put it,[1] "medical scrutiny has disclosed a wide range of clinical manifestations which in their aggregate have come to be known as 'the alcoholic diseases' ". Though alcohol may not always produce an obvious pathological condition, there is no doubt that its effect often becomes manifest in the presence of some acute infection—the chronic alcoholic seems to lose his powers of resistance and succumbs, where another not given to alcoholic habits will recover. It has been truly said that the man who can carry his liquor is often carrying his own coffin. There is a common belief that alcohol will enable a man to undertake work which he cannot do without it. This is not true, except in so far as what is done is the result of the removal of psychological inhibitions. The stress of war has shown alcohol to be an unreliable prop on which to lean. On a previous occasion the opinion of Colonel A. Graham Butler has been quoted. In the second volume of "The Australian Army Medical Services in the War of 1914-18" (the official history) he wrote that for commissioned officers, if senescence was excepted, dependence on alcohol was probably the most frequent immediate cause of failure to "make good" in the field, and that on Gallipoli it was the direct cause of one major tragedy. Addiction to alcohol is one of the most difficult of the clinical problems with which the medical practitioner has to deal. Rotman, in the article mentioned, states that there are many definitions for alcoholism; he defines an alcoholic addict as an individual who exhibits a strong psychological affinity for one or more of the many alcoholic products, coupled with an inordinate physiological

[1] *The Journal of the American Medical Association*, March 10, 1945.

vulnerability of his body tissue to them. But the treatment of alcoholic patients, whether they are suffering from the effects of an acute attack or have qualified to join the ranks of addicts, is only part of the whole problem of alcoholism. It is peculiarly the problem that has to be shouldered by the medical profession. The remainder of the problem, and indeed the larger part, since it is concerned so much with prevention, is sociological. From this the medical practitioner cannot turn aside any more than he can from any other sociological problem of the day. In fact the nature of the problem, affecting so closely as it does the habits, the happiness and general welfare of individuals, seems to point to him as one of those members of the community who must make its solution their immediate concern. He will not be able to accomplish much unaided, but he has special knowledge, he has prestige, and he must use both in this all-important matter.

In any approach that is made to the problem of alcoholism psychological considerations must be continually kept in mind. Alcohol is consumed for many reasons. The habit is quite often formed simply because of imitation or because there is little else to do. That alcoholism offers an escape from reality is always advanced as one of the reasons for its prevalence, but this will not be the reason behind the alcoholism of many of the younger devotees of today. Imitation and a false sense of values consequent on the topsyturvydom of war must operate in many instances, and there is no doubt that many persons make it their business to seek supplies of alcohol at any price merely because supplies are hard to obtain. Rotman, who incidentally designates alcoholism as a social disease, quotes the opinion of the Research Council on Problems of Alcohol of the American Association for the Advancement of Science that there are indications in the United States of another drift towards prohibition. Though the actions of the United States in this matter are not the immediate concern of Australian doctors, the impression is widespread that the prohibition laws in America were not an unmixed blessing. We could not wish for the introduction of such a measure into this country when we consider the activities of the black market addicts in respect of certain goods that are at present rationed. It is, moreover, extremely unlikely that any Australian government would risk its political neck by the introduction of such a measure. Any steps that are taken must be in another direction. In this regard we can do no better than quote the objects of the Liquor Reform Society of Queensland, though we do not necessarily agree with all of them:

1. To create in the community a proper understanding of the physical and social effects of alcohol, by providing a scientific approach to the problem.
2. To support the ideal of voluntary abstinence among all sections of the community.
3. To educate those accustomed to take alcohol in the serious consequences of over-indulgence.
4. To advocate the public control and management of production and distribution in the liquor industry for the purpose of eliminating private profit in that industry.
5. To initiate the practical reform of liquor abuses.
6. To advocate the amendment of the liquor laws in keeping with these objects and to demand their rigid enforcement.

The Liquor Reform Society of Queensland is a body with an impressive list of office-bearers. The patron is the Minister for Public Instruction (of Queensland), the President is the president of the Society of Returned Medical Officers, the vice-presidents are the professor of medical psychology in the University of Queensland, the professor of pathology in the university, the past president of the Australian Natives Association, the president of the New Education Fellowship and the president of the Returned Sailors, Soldiers and Airmen's Imperial League of Australia. On the general committee (of 26 members) are such persons as the honorary editor of *The Queensland Digger*, the president of the Chamber of Commerce, an executive officer of the Liquor Trades Employees' Union, the secretary of the Trades and Labour Council and the secretary of the Queensland Bowling Association with a former president of the Queensland Branch of the British Medical Association. Of the objects of this society the most important seem to be the reform of liquor abuses and the amendment of the liquor laws. The lines along which reforms might be introduced are those suggested by the Society of Returned Medical Officers of Queensland—they have been quoted in these columns on a previous occasion and are included in the following clauses:

1. The alcoholic content of all beer should be considerably reduced.
2. All spirituous liquors should be rationed in the same way as clothes are rationed.
3. There should be prohibition of incentives to excessive drinking, such as treating, credit and canvassing for liquor orders.
4. The organizations for the entertainment of soldiers should be considerably extended.
5. More facilities should be provided to encourage people to drink at tables instead of standing at bars.
6. No alcohol should be allowed on battle stations except the amount required for regulation issues.
7. The attitude towards alcohol drinking should be changed by a vigorous educational campaign.

At the start we set out to proclaim the obvious and to declare facts not widely known. This has been done. From what can be gathered the Liquor Reform Society of Queensland is an active body; it cannot fail to make some impression on the public mind. Its president and some of its office-bearers are busy medical practitioners. They with the whole society and its other office-bearers are setting an excellent example in public service. Unless something of this kind is done and the public conscience is aroused, another generation in thirty years' time will read in the "Official Year Book of the Commonwealth of Australia" the same statement of hopeless despair that we can read now in the year book of thirty years ago.

Current Comment.

PROTEIN NUTRITION IN PREGNANCY.

THAT the protein needs of a pregnant woman are different from those of other persons is generally recognized. Her metabolism is increased; she has to provide for the storage of nitrogen, the growth of her own body, the growth of the fœtus. She has to prepare for the ordeal of parturition, and her mammary glands, controlled by the development of hormones, undergo changes preparatory to lactation. These facts are stated at the beginning of an interesting report that has been prepared by P. F. Williams at the request of the Council on Foods and Nutrition of the American Medical Association on the importance of adequate protein nutrition in pregnancy. Williams points out that an increase in protein intake to approximately 1·5 grammes per kilogram of body weight per day during pregnancy and to 2·0 grammes per kilogram during lactation for a woman weighing 56 kilograms, which has been recommended by the Committee on Food and Nutrition of

[1] *The Journal of the American Medical Association*, April 21, 1945.

the National Research Council, Washington, presupposes a previously normal protein intake and nutritional status. Defects in the diet may be caused by economy, by ignorance, by custom or habit, by actual or supposed food idiosyncrasies and by erroneous advice. Williams holds that all but the first of these can be overcome by education. Restrictions or deficiencies in protein intake are nearly always accompanied by restrictions or deficiencies in intake of other equally important factors. Deficiencies in protein content of the diet of the pregnant woman lower her nitrogen level, deplete the body tissues by utilizing them for the normal protein needs, lower the serum protein level and may lead to nutritional œdema. Anæmia, poor muscle tone of the uterus, lowered resistance to infection and insufficient lactation may all result from a poor protein intake. Lactation makes large demands on the nitrogen stores, and the food intake of a nursing mother should contain sufficient protein for herself and to provide essential amino acids in her breast milk. The daily diet of the lactating woman should include one quart of milk, two eggs and a large serving of meat. Other sources of protein, both animal and vegetable, will provide the remainder that is required. There is evidence that an adequate protein intake may obviate the occurrence of anæmia in pregnancy; hæmoglobin contains protein as well as iron. Williams points out that as a result of controlled clinical observations the belief that a high protein intake is responsible for the occurrence of toxæmia of pregnancy is not now held so widely as it used to be. Strauss has held that a diet with a low protein content may be a cause of toxæmia in pregnancy. Many observers hold that if a diet with a high protein content is given to a pregnant woman, toxæmia will not occur. This is probably true of women who have suffered from no renal disability before pregnancy. Williams states that a modified protein intake should be prescribed in the presence of nitrogen retention, observed, for example, in chronic renal disease, or in the presence of an acute inflammatory process such as acute glomerulonephritis. This is a subject which should engage the attention of all practitioners who are responsible for the care of women during pregnancy. Added importance of the question arises because of the employment of pregnant women in industry and because of the present-day scarcity of certain necessary foodstuffs.

CARDIAC DISTURBANCES AS BILIARY REFLEXES.

EVERY clinician has observed cardiac irregularities which cleared up on surgical treatment of the gall-bladder and which undoubtedly could be classed as reflexes. Two American research workers, S. W. McArthur and H. Wakefield, have recently investigated this problem experimentally in the human subject.[1] These authors state: "The association of organic heart disease and biliary tract disease, especially stone-bearing gall bladder, has been emphasised by clinicians for many years. Physiologists have demonstrated the presence of viscero-cardiac reflexes, especially in the lower animals, and more recently experimental work on animals has demonstrated reduced coronary blood flow on distension of the stomach and gall bladder." One might perhaps cavil at the term "organic", for those deviations from normal in the heart's action which are observed in pathological conditions of the biliary tract, are more usually functional and clear up without residual damage when the exciting cause is removed.

The experiments were carried out on seven female patients suffering from gall-stones. Cyclopropane anæsthesia, preceded by the administration of one-sixth to one-quarter of a grain of morphine sulphate with one one-hundredth of a grain of atropine or one one-hundred-and-fiftieth of a grain of scopolamine, was employed for the cholecystectomy. The fundus of the gall-bladder was suddenly distended with thirty millilitres of normal saline solution, and the electrocardiogram, chiefly from Lead II, was registered. Four of the patients showed some aberration of the electrocardiogram, either extrasystoles, increase of *P-R* interval or increase of tempo. The authors, however, candidly admit that there was "no specific reaction". In some patients distinct changes occurred immediately; in others little or nothing. Two criticisms may be advanced concerning this research. In the first place better success might have been achieved if atropine had not been administered, for previous investigations had shown that if the vagi are cut or paralysed, no cardiac reflexes can be elicited from stomach or gall-bladder. The second and more serious criticism is that it is not distension *per se* which causes pain, but muscular effort of the wall of the viscus arising from or combating this distension, and it is highly likely that it is from the receptors in the straining muscle that the impulses arise which operate on the cardiac medullary centres.

[1] S. W. McArthur and H. Wakefield: "Observations on the Human Electrocardiogram during Experimental Distension of the Gall Bladder", *The Journal of Laboratory and Clinical Medicine*, April, 1945, page 349.

AIR-BORNE HORMONES AND VITAMINS.

IN botanical circles the conception of aerial hormones has passed from the realm of speculation to that of established fact. The volatile agents given off from ripening fruit are now recognized, and for their activities provision is made. The observation is an old one that in certain jungles, notably in Java, the bursting into blossom of a particular plant will rapidly make a similar flowering in the same species down wind. The physicist Tyndall held that the vapours giving the scent of night flowers diminished loss of heat by radiation—a very far-fetched hypothesis; then came the more satisfactory suggestion that fertilization by visiting insects was the solution of the problem. Today there is some scepticism whether this explains the facts. Whether animals are influenced biochemically by air-borne matter, apart from allergical responses, has not been subjected to systematic investigation. Tentative suggestions along these lines have been put forward sporadically to explain the stimulating effect of mountain atmosphere or the "deadness" of air from compressed air drills. Now N. G. Cholodny, a member of the Academy of Sciences of the Ukrainian S.S.R., has come boldly forth as an advocate of the existence of atmospheric vitamins which are liberated from plants and especially from growing plants and which operate on the human organism.[1] The minuteness of the amounts need not be regarded as an adverse argument, for if the air contains only one part in a million of an easily absorbed ingredient, then in the course of a day three to four milligrammes can be admitted by the lungs, and this amount is comparable with the masses of effective vitamins. If this hypothesis could only be proved, and this the Russian author has not done, a number of curious facts could be explained. The evil effects of bad ventilation are certainly not attributable to reduction of oxygen nor to rise of carbon dioxide, which latter is now taken as an index of overcrowding and not as a poison *per se*. Leonard Hill abandoned chemical considerations and devoted his attention to heat and humidity, but this also has not met with full acceptance. Absence of necessary hormones or vitamins or presence of inhibiting volatile matter offers a better explanation. Why is it that parks and gardens are universally recognized as giving health to a city apart from the limitations they impose on the erection of factories? The amount of oxygen sent into the air or of the carbon dioxide trapped is too trifling to be taken into serious consideration. The transpired water may temper the air in dry climates, but not in humid. Most people hold that a child reared in the country has a better start in life than one brought up in a city flat, though, contrary to current belief, the diet of the country child is more restricted than that of its city cousin. The formation by growing plants of aerial vitamins could solve this problem also. It is a pity that the Ukrainian scientist has not embarked on an experimental study and given us something more than speculation, stimulating though this may be.

[1] N. G. Cholodny: "Atmosphere as Possible Source of Vitamins", *Comptes rendus* (Doklady) *de L'Académie des sciences de L'Urss*, Volume XLIII, 1944, page 257.

Abstracts from Medical Literature.

PÆDIATRICS.

Early Immunization against Pertussis with Alum-Precipitated Vaccine.

W. SAKO, W. L. TREUTING, D. B. WITT AND S. J. NICHAMIN (*The Journal of the American Medical Association*, February 17, 1945) present the results of a study conducted over a period of twenty-seven months, during which 3,793 infants were inoculated with alum-precipitated *Hæmophilus pertussis* vaccine according to the recommended dosage of 0·2, 0·3 and 0·5 cubic centimetre. At the time of the initial injection all the babies were aged under three months and the majority were aged under two months; 1,834 members of the group were followed for varying periods of time. The purpose of the study was to evaluate the incidence and severity of reactions following inoculations of the alum-precipitated vaccine, and to investigate the young infant's capacity to develop pertussis agglutinins after immunization. The babies were divided into two groups. The first group (A) consisted of 2,000 Negro and 200 white babies, and group B consisted of an additional 255 infants. The babies tolerated the inoculations well. Of the 6,600 injections in group A, 8·6% were followed by local reactions and 0·6% by abscesses. Of the 703 injections in group B, 5·5% were followed by local reactions and 3·3% by abscesses. The abscesses were all sterile and were not usually associated with a febrile reaction or discomfort; all drained spontaneously or disappeared within one or two months; none was incised. The vast majority of local reactions in group A were mild. Local reactions much more frequently followed the second and third injections than the first. There was no appreciable difference in the incidence of local reactions among the Negro and white children. It was observed that these young infants tolerated the inoculations much better than did older infants and children. Systemic reactions followed 7·1% of the inoculations in group A; 3·4% were severe and 77·5% were mild. In group B 5·2% of the injections occasioned systemic reactions; 2·8% were severe and 82·2% were mild. In three instances severe illness followed inoculation; this illness is counted among the reactions, though a causal relationship would be difficult of proof. A peculiar paroxysmal cough resembling that of pertussis followed inoculation with some frequency; it began shortly after injection and quickly disappeared. Agglutination tests were performed to determine the immunological responses of the babies. The greatest proportion of positive reactions were found between the third and fourth months after completion of the series. Tests made twenty-four months after completion of the series showed that the effect of inoculation was apparently lasting; 63% of subjects then tested gave positive reactions. These findings support the value of immunization in early infancy, in contrast to the popular belief that young infants cannot elaborate antibodies as a result of active immunization. Further, the incidence of pertussis later among those immunized children who were known to have been exposed to infection provided more evidence that early immunization is practicable. The authors append a note to the paper concerning abscess formation. They state that: (i) the directing of the needle downward, as recommended by Sauer, or upward, as is usually done, did not influence the incidence of abscess formation; (ii) deep subcutaneous or intramuscular inoculations were associated with a much lower incidence of abscess formation than superficial inoculations; (iii) the greatest factor in abscess formation was found to be the intracutaneous introduction of the alum-precipitated vaccine.

Precocious Skeletal Development.

ROGER L. J. KENNEDY (*The Journal of the American Medical Association*, March 10, 1945) has studied the clinical histories of a series of 23 children with precocious skeletal development, to determine (*a*) in what conditions precocious skeletal development occurs, and (*b*) the factors which may be responsible for skeletal precocity. The patients were divided into four groups: (i) three patients with proved adrenal cortical tumour; (ii) twelve patients with either proved or assumed hyperplasia of the adrenal glands; (iii) three patients who had been treated with endocrine preparations; (iv) five patients with miscellaneous disorders (vomiting and diarrhœa, obesity and large stature, anomalies of the eyes, hæmangioma of the left orbit and cheek, and Albright's syndrome). Discussing the excretion of 17-ketosteroids in the urine in respect of the first group, the author states that in one of these three cases, in which the excretion of 17-ketosteroids was studied before operation, the amount excreted was 170 milligrammes in twenty-four hours, a figure far in excess of normal. In a survey of the entire series of cases, the first fact to become evident is that precocious skeletal development is not a peculiarity of any single clinical syndrome. Although it was found in some cases of adrenal cortical disease in which the excretion of 17-ketosteroids was increased, in other cases of the same condition the skeletal development was found to be within normal limits. It is clear from the series that precocious skeletal development may be found with or without obvious endocrine disorders, and that it may follow administration of endocrine preparations. The author concludes that known factors, such as the androgens, may exert effects on the skeleton which lead to precocious development or premature maturation, but such effects are not inevitable in all cases in which their excretion in the urine is increased above normal. Another factor or other factors may operate together with, or independently of, the androgens to account for skeletal precocity.

Allergic Manifestations of the Newborn.

G. A. CAMPBELL (*The Canadian Medical Association Journal*, March, 1945) reports that a *questionnaire* was sent to some six hundred of the leading obstetricians, allergists and pædiatricians of North America in order to discover the consensus of opinion on allergic manifestations of the newborn. He states that what he calls the "writings on the wall" in this matter are frequently overlooked by obstetricians. At the same time he quotes authorities in support of the view that potentially allergic children can be recognized during their first few weeks of life. While there is no group of symptoms which will enable a selection to be made of those infants who will subsequently become allergic, the results of the *questionnaire* indicate that the following signs should arouse suspicions of potential allergy: reto-auricular intertrigo, especially behind the left ear; *seborrhœa capitis* with or without patches of seborrhœic eczema over the shoulders, arms, in the eyebrows, elbows and popliteal spaces; intestinal bleeding after the ingestion of cow's milk; the so-called geographical tongue; visible peristaltic waves; intra-uterine hiccup; the occurrence of vomiting after operation for pyloric stenosis; excessive rubbing of the nose; excessive sneezing; excessive hunger on a formula that contains sufficient Calories; allergic colic; excessive reaction to silver nitrate drops; excessive reaction to ammoniated mercury ointment and other preparations used to prevent impetigo; urticaria occurring shortly after breast feeding and disappearing before the next feeding; intolerance to orange juice and cod liver oil; unusual sensitivity to sugar; early excoriation of the buttocks; asthma; laryngospasm; glossitis; œdema of the feet and hands; unstable parentage. An infant born of allergic parents should always be considered potentially allergic. The author has found that 25% of his patients revealed allergic symptoms during the newborn period, which might have been recognized as such had the attending physician been "allergically minded". The apparent cures achieved after removal of offending proteins in 24 cases quoted by him make it probable that an allergic diathesis, present and recognizable at birth, was the forerunner of later manifestations of allergy and that earlier and more searching investigation might have prevented much disability.

Gonococcal Vaginitis.

B. C. COMPTON *et alii* (*The Journal of the American Medical Association*, January 6, 1945) describe the treatment of 422 children with gonococcal vaginitis. Infection arose from highly infective vaginal discharges, and 72% of children in this series gave positive smears for gonococci. Treatment was tried with sulphathiazole, one gramme daily for two to three weeks for children between one and four years of age. Sulphadiazine was used in half this dosage. "Negative" swabs were obtained at the end of one or two weeks. However, the authors fear sensitization to sulphonamides and prefer œstrogen treatment. The œstrogens were used as suppositories, natural or synthetic, or were given by mouth. Diethylstilbœstrol, 0·5 milligramme a day for children between six months and one year of age, and 1·0 to 3·0 milligrammes per day for children between one and ten years, or hexestrol dihydrostilbœstrol in doses four times as large were given by mouth. Amniotin perles, œstriol gelatin capsules and œstrogenic tablets were also used as suppositories, 35,000 international units being suf-

ficient to produce a "negative" smear in two or three weeks. Complications consisted of slight hypertrophy of the breast or clitoris and labia in about 50% of cases, but the effects disappeared as soon as treatment ceased. Other forms of treatment with kaolin and sand and floraquin were ineffective.

The Epidemiology of Poliomyelitis.

ROBERT WARD (*The Journal of Bone and Joint Surgery*, October, 1944) states that studies in the natural history of poliomyelitis provide no support for the belief in the olfactory portal of entry of virus, but do suggest that the entire alimentary tract may provide a site or sites of primary attack and invasion. The skin remains a possible portal of entry. The chief mode of elimination of virus at present appears to be by way of the stools. The striking seasonal incidence of the disease in North America, with the epidemic peaks occurring as a rule in late summer and early autumn, are not explained on the basis of contact infection. The author discusses the evidence for the human alimentary tract as a portal of entry, and states that the finding of abundant virus in stools, sewage and flies, whilst not establishing these latter facts as definite links in the infective chain, nevertheless suggests that poliomyelitis should be placed tentatively in the group of excremental infective diseases until other modes of spread become established.

ORTHOPÆDIC SURGERY.

Osteoid Osteoma.

SAMUEL KLEINBERG (*The American Journal of Surgery*, December, 1944) reports three cases of non-suppurative or sclerosing osteomyelitis. The sites in these cases were the fibula, laminæ of a lumbar vertebra and in the neck of the talus. Osteoid osteoma, which is fairly common, presents a triad of significant features. Firstly pain, which is at first mild and intermittent and after several months becomes continuous, is always in the same site and is characteristically limited to a comparatively small area. Secondly, tenderness is present on pressure over the region of greatest intensity of pain. Thirdly, the skiagram exhibits a small round or oval rarefaction of bone at the site of tenderness. The rarefied area is surrounded by a zone of sclerosis which may appear at a narrow ring or may extend for several inches beyond the central focus. Treatment is excision of the diseased area which consists of granulation tissue.

DeQuervain's Disease.

D. C. PATTERSON AND ELWOOD K. JONES (*The American Journal of Surgery*, February, 1945) discuss the ætiology, pathology and treatment of stenosing tendo-vaginitis at the radial styloid. The authors state that the ætiological factor is undue trauma, and this is generally of a chronic nature. There is a great preponderance of the disease in females. In a series of 32 cases treated by the authors there were eight males and twenty-four females. The authors state that the symptoms and signs are quite definite and the similarity in all cases is very striking. There is a gradual onset of pain over the radial styloid process. Pain is aggravated by flexure of the thumb in the palm of the hand, and with fingers closed over it when a sharp ulnar adduction is made. Operation is advocated, as the procedure is simple and gives early relief and the period of disability is short. Under local anæsthesia the annular ligament and the tendon sheaths of the *abductor pollicis longus* and the *extensor pollicis brevis* are divided. The authors point out that care should be taken to avoid a small branch of the radial nerve. Free motion of the thumb is permitted in two days, and full use is generally possible at the end of two weeks. The authors have had no case in which relief was not obtained.

Fractures of the Zygomatic Tripod.

H. GORDON UNGLEY AND STEPHEN C. SUGGIB (*The British Journal of Surgery*, October, 1944) describe various types of fractures of the zygomatic tripod in a series of fourteen patients. These fractures were classified as follows. (i) Blows from the front cause a double vertical fracture line, one through the anterior antral wall, the other lateral and parallel through the body of the zygoma. The intervening block of bone is forced directly backwards. (ii) Blows from the antero-lateral aspect cause the common variety of fracture and result in the zygoma as a whole being driven posteriorly and medially into the antrum. The fracture line passes through the weakest point, that is, the region of infraorbital foramen. In this telescopic variety comminution of the anterior wall of the antrum and separation at the zygomatico-frontal and zygomatico-temporal synostoses often take place. (iii) Blows from the nasal aspect force the antero-lateral portion of the maxilla, together with the zygoma, in a backward and lateral direction. The authors stress the importance of early diagnosis and prompt surgical intervention. One patient was successfully treated by operation thirty-seven days after the injury. The authors favour the canine fossa approach. Various manœuvres for fixation of the fragments are outlined. If X-ray films taken in an orbitomental position according to Dr. Graham Hodgson's technique demonstrate the absence of comminution of the anterior antral wall, and if the injury is recent, they consider that a temporal approach is worthy of trial.

Insufficiency Fracture of the Calcaneus.

CLARENCE W. HULLINGER (*The Journal of Bone and Joint Surgery*, October, 1944) reports 71 cases of insufficiency fracture of the calcaneus in 53 patients seen during a period of seven months at Camp Wheeler. The author in a note at the end of the paper states that since the paper was written, 49 additional patients with these fractures have been seen, and in eighteen of these cases the fractures were bilateral and symmetrical. The author has found that these fractures are of common occurrence among trainees. The fractures, characterized by insidious onset following extensive repeated minimal traumata to the heels as a result of walking and marching, differ from "march fractures" of the metatarsals in that the factor of jumping is present, bringing greater and differently applied traumata to bear on the heels. Examination reveals a diffuse moderate swelling of the soft tissues over the medial and lateral surfaces of the calcaneus. This swelling disappears after four to ten days' rest in bed, and recurs promptly if the patient is then allowed to walk. Tenderness is present on compression of the calcaneus; this remains for several weeks, even though no swelling is present. In the author's cases during the first four to five weeks after onset X-ray examination revealed no abnormality. Repeated radiological examinations after five to eight weeks showed an irregular sclerotic line of callus, frequently five millimetres wide, in the posterior half of the calcaneus, extending incompletely through the bone and transverse to the long axis, indicating a healed fracture of this bone. Primary treatment included rest, avoidance of weight bearing and physical therapy. A little later, felt heel inserts or rubber heel elevations, or both, were used. After a period of eight to ten weeks, the men were able to return to full military duty. No recurrences have been seen among patients treated in this manner.

Bursitis in the Region of the Tibial Collateral Ligament.

ALLAN F. VOSHELL AND OTTO C. BRANTIGAN (*The Journal of Bone and Joint Surgery*, October, 1944), discussing bursitis in the region of the tibial collateral ligament, mention the following pertinent facts described by them in two previous papers in the same journal. (i) The tibial collateral ligament moves anteriorly with extension of the knee, and posteriorly with flexion. (ii) The parallel fibres of this ligament are taut in extension and do not relax in flexion. (iii) Bursæ, one to three in number, are normally present beneath the tibial collateral ligament. The authors present a series of ten cases of bursitis, four of which were proven by operation. The most likely causative factors of bursitis in this location are compression of friction of the bursa between the collateral ligament and the edge of the tibial condyle by direct contusions, and unaccustomed frequent knee action. Most patients gave a history of recurrent attacks of pain in the knee. There was in each case a complaint of tenderness on pressure beneath the tibial collateral ligament near the middle of the parallel fibres. The area of tenderness was almost point-like and was usually located at the articular margin of the tibia, although it might be over the meniscus. Signs of swelling and semi-fluctuation were present in some cases. In each case there was a complaint of pain when the tibial collateral ligament was tightened by hyperextension or abduction of the tibia, with relief on adduction and usually on flexion. The authors state that if the bursa is palpable the contents should be aspirated. The area is infiltrated with "Novocain", whether bursal fluid has been aspirated or not. Rest, support and heat are used. If recurrence takes place the treatment is repeated until the surgeon is convinced that conservative measures are unavailing. As a last resort, or if the enlargement is such as to be a constant mechanical hindrance to the free action of the tibial collateral ligament, operative exploration of the area is undertaken and the bursa is excised.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held at the Royal Alexandra Hospital for Children on April 17, 1945. The meeting took the form of a series of clinical demonstrations by the members of the honorary medical staff of the hospital. Parts of this report were published in the issues of June 16 and July 7, 1945.

Hodgkin's Disease.

DR. R. J. TAYLOR showed a male child, aged eleven years, who had been admitted to hospital on October 30, 1944, with the history that he had not been well for six months, suffering from frequent colds and night sweats. He had also had a skin rash for six weeks. He had had no cough, but had been intermittently feverish. His only previous illnesses were pertussis and measles.

On examination, the boy appeared healthy; he had some impetigo of the scalp and ears and also some tinea. No definite abnormal signs were found in the other systems. X-ray examination of the chest on October 30 revealed intense congestion of both lungs, almost bronchopneumonia; no enlarged glands and no bronchiectasis were seen. The condition was not typically tuberculous. A blood count gave the following information: the erythrocytes numbered 5,870,000 per cubic millimetre, and the hæmoglobin value was 14·1 grammes *per centum*; the leucocytes numbered 29,600 per cubic millimetre, 66% being neutrophile cells, 29% lymphocytes and 5% monocytes. X-ray examination of the sinuses revealed no abnormality. The urine was normal. No tubercle bacilli were found in the sputum, and the Mantoux test failed to produce a reaction.

The child's condition remained much the same for the next few weeks, but the number of erythrocytes dropped to 4,200,000 per cubic millimetre. A bronchoscopic examination on December 18 revealed no abnormality except œdematous bronchial mucosa. On December 30 the child became pyrexial and had a violent fit of coughing; he felt as if something was "sticking" in his throat. X-ray examination of the chest revealed little change. Some sputum began to be produced. The child was given sulphadiazine and later penicillin. His cough gradually became worse, and he had severe attacks of bronchial spasm. Further X-ray examination of the chest on February 13, 1945, revealed patchy consolidation of the lungs; the condition had not altered apparently, but the enlargement of the hilar nodes had increased since the previous X-ray examination; the appearances suggested (i) Hodgkin's disease, (ii) tuberculosis of adult type. The Mantoux test failed to produce a reaction.

On February 16 enlargement of the cervical glands developed. A biopsy was performed; the report stated that the findings were suggestive of early Hodgkin's disease, but not sufficiently so to warrant an absolute diagnosis. It was decided to give the patient a course of deep X-ray therapy (twelve doses). An X-ray film taken after this treatment revealed that the lungs were much clearer. Dr. Taylor said that the child's general condition deteriorated; he became breathless and distressed, and his colour was worse.

Hemiatrophy.

DR. C. WARBURTON showed a female patient, aged ten years, suffering from hemiatrophy. The onset of the disease was described by the mother as occurring with a fairly large area of bruising on the inside of the left thigh. This was noticed in October, 1939, when the child was aged four and a half years. Dr. Warburton first examined her in June, 1940, for a cough which had remained since an attack of whooping cough in March of that year. At that time the skin had a dry, tight and shiny appearance on the inside of the left thigh. The child was suffering from chronic bronchitis, possibly early bronchiectasis, and the mother was advised to send her to the country. When she returned in January, 1941, the mother noticed another pigmented area about one and a half inches in diameter over one of the lower cervical spines. Then the pigmentation appeared on the left arm and forearm, together with wasting of both upper and lower limbs on the left side. From then on the wasting progressed until it included the left hand and left foot, the fingers and the toes (during 1941, 1942, 1943 and 1944). Pigmentation was noticed over the lower ribs on the left side about twelve months after the appearance of that on the arm and leg. The mother said that from time to time during the course of this condition the child suffered from cramp in the foot and from pins and needles in the hand (the hand and foot would go to sleep). There was no history of immediate malaise, headache *et cetera*. The child attended school in the country and walked two miles to school each day. No sickness occurred during this period in the country. She had previously suffered from bronchitis in 1936, from giant urticaria in 1938—she attended the allergy clinic at the Royal North Shore Hospital—from measles in May, 1939, whooping cough in March, 1940, and chronic bronchitis, possibly early bronchiectasis, in June, 1940. The mother's parents had both died from Parkinson's disease at the age of seventy-five years.

Dr. Warburton said that examination revealed wasting of the left arm, forearm, hand and fingers, and of the left thigh, leg, foot and toes. Some remains of the sclerodermatous patches mentioned earlier were to be seen, but these were gradually fading. All other systems and the blood pressure were normal. The hair, which was absent from the affected areas was just beginning to grow. There was no obvious wasting of the face. The earlier pigmented patch in the seventh cervical region suggested that some wasting might have occurred in the cervical region and remained undetected. X-ray examination of the long bones revealed slight rarefaction. A blood count, estimation of the sedimentation rate, a Wassermann test of the blood, examination of the urine and a Mantoux test all revealed no abnormality.

Dr. Warburton said that the differential diagnosis was from (i) progressive lipodystrophy, (ii) infantile cerebral hemiplegia—arrested growth, (iii) facial atrophy in poliomyelitis, (iv) atrophy following nuclear lesions and sympathetic nerve paralysis, (v) acquired facial hemihypertrophy, and (vi) scleroderma confined to one side of the face. The literature reported that in some cases hemiatrophy had followed epidemic encephalitis. It was interesting to note that this child suffered from a severe attack of measles in May, 1939, and that the mother's earliest recognition of the onset of the disease occurred in October, 1939; moreover, Parkinson's disease occurred after encephalitis. Both the mother's parents had died from Parkinson's disease. It was an interesting fact that, although the condition was an atrophy of skin, fat, muscle and bone, in this case at least it was the scleroderma or skin lesion that made the first appearance. In *Archives of Neurology and Psychiatry* in 1932, three cases were reported of facial hemiatrophy which extended to other parts of the body. In the present case total hemiatrophy was present except for the face. Four hundred cases of facial hemiatrophy had been reported in the world's literature, but only 23 cases of total hemiatrophy. In this condition all structures were involved—skin, subcutaneous fat, muscle and bone. The cases of total hemiatrophy reported had always been associated with some scleroderma. These cases had to be distinguished from arrested growth as seen in infantile cerebral hemiplegia, usually of spastic nature.

Dr. Warburton said that the disease was thought to be an abiotrophy due to sympathetic-parasympathetic imbalance. This was suggested by several cases which had been associated with tuberculous glands of the neck and with face, neck and arm hemiatrophy *plus* the Argyll-Robertson pupil. A case was reported of tumour of the third ventricle associated with a "crossed hemiatrophy"—the face was affected on one side and the limbs on the other. The condition was to be contrasted with crossed hemiplegia—Millard-Gubler's syndrome. Further to the suggested ætiology, some cases had followed epidemic encephalitis. It was stated that the condition might arise purely peripherally, as several cases were reported to have followed trauma of the face and limbs. The prognosis was generally good, as the condition arrested itself in a few years. There was no known treatment. Several patients whose scleroderma was pronounced had been submitted to sympathectomy, when the condition was localized (for example, in an upper limb). The consensus of opinion seemed to favour a parasympathetic factor; but no favourable results had been obtained from the use of "Prostigmin". In conclusion, Dr. Warburton thanked all those who had shown interest in the case, and especially Sir Charles Blackburn for the diagnosis.

Lye Œsophageal Stricture.

DR. PATRICIA DAVEY showed a female child, aged seven years, who had been admitted to hospital on January 30, 1945, having swallowed about one ounce of caustic soda on January 7. She had been well since, except for some

difficulty in taking solid foods. An X-ray examination revealed fibrous contraction of the lower half of the œsophagus with dilatation above; fluids seemed to pass well. An œsophagoscopic examination revealed stenosis of the œsophagus beginning about one inch from the upper end. A small bougie would not pass.

It was decided to establish a gastrostomy so that œsophageal dilators might be drawn up from below. This was done on February 13. On February 25 the child swallowed a linen thread. On March 2 the thread was drawn through the gastrostomy wound. At the time of the meeting a series of dilatations of the stricture with gradually increasing sizes in bougies was being carried out through the gastrostomy.

Irreducible Intussusception.

DR. E. S. STUCKEY showed a male baby, aged four months, who had been admitted to hospital on March 20, 1945. He first became ill on March 9, when he woke up screaming and vomiting, and he had been vomiting at intervals since. He had had no motion on March 9 or 10, and blood was returned from a bowel washout on March 11. Since then bowel lavages and enemata had been given, with practically no result.

On examination, the child was pale and looked ill. The abdomen was full, peristalsis was visible and a mass was thought to be felt on the right side. Operation was performed, and an intussusception of the ileo-colic type was found, beginning three and a half inches from the ileo-caecal valve. The intussusception was irreducible; an ileostomy was established two inches above the intussusception, a rubber tube was invaginated and the wound was closed. The child was given glucose and saline solution by the continuous intravenous drip method. Dr. Stuckey said that since the operation the child had passed large quantities of mucus and blood. The tube was removed on March 25, and fæces drained through the wound. His condition was good. He had been given a blood transfusion.

So-Called German Measles Cataract, with Congenital Cardiac Defect.

DR. D. G. R. VICKERY showed a female patient, aged four years, whose mother had suffered from German measles early in the second month of her pregnancy. The child's birth weight was six and a half pounds. A cataract in the right eye was aspirated by Dr. N. McA. Gregg when the child was aged twelve months. The child had always been small and was a "pocket edition" of normal. She had cardiac dwarfism; her present weight was 23·75 pounds and her head circumference 17·6 inches. She had no deaf-mutism; she talked and heard well, and was of normal intelligence. Congenital cardiac disease with considerable marked cardiac enlargement was present. Precordial bulging was observed, and a loud systolic murmur over the precordium was best heard in the third intercostal space, just to the left of the sternum; the findings suggested a patent interventricular lesion. There was no machinery murmur typical of patent *ductus arteriosus*, and no clubbing of the fingers and toes and no cyanosis were present. In an X-ray film the cardiac shadow suggested a patent interventricular septal lesion and possibly a patent *ductus arteriosus*. Dr. Vickery said that these were the two common lesions in this type of congenital heart disease, occurring either separately or together.

So-Called German Measles Deaf-Mutism, with Patent Ductus Arteriosus.

Dr. Vickery next showed a male child, aged four years; at the age of eight months, whilst he was suffering an attack of croup, his mother was told that the child had a leaking valve. When he was twelve months of age the mother suspected that the child was backward, because he did not respond to her voice when spoken to. When he was two and a half years old she consulted an ear, nose and throat surgeon, because the child was unable to hear and spoke only an occasional monosyllable. The child's birth weight was five pounds; his present weight was 27 pounds and his head circumference 17·75 inches. He was a "pocket edition" of normal, and exhibited "cardiac dwarfism". He could say a few monosyllables, but did not answer to the spoken voice. He could hear hand claps, whistles and the telephone bell and other sharp noises; he had been concentrating better recently. Examination revealed slight precordial bulging and considerable enlargement of the heart to the left, and a machinery murmur typical of patent *ductus arteriosus* was heard over the pulmonary area. No cyanosis or clubbing of fingers and toes was present.

Dr. Vickery said that the mother had had German measles during the first three months of her pregnancy, and the child exhibited one of the common syndromes of this occurrence—congenital cardiac disease and deaf-mutism. His physical condition and to some extent his mental condition should benefit by operation and ligation of the *ductus arteriosus*.

Lipodystrophia Progressiva.

Dr. Vickery's next patient was a male child, aged eight years, a twin; the other twin was perfectly normal. For six months his mother had noticed that his face was becoming excessively emaciated. Except for a tendency to recurrent attacks of bronchitis for five years, the child appeared to have been perfectly well.

Examination revealed symmetrical and bilateral wasting of the face, and also to a lesser degree some wasting of the arms and the upper portion of the trunk. The lower half of the body appeared perfectly normal. The calves and thighs looked relatively hypertrophied. No loss of power had occurred in any of the muscles of face or limbs, the wasting being entirely due to loss of fat. Examination of the various systems revealed no abnormality. The Wassermann test failed to produce a reaction. X-ray examination of the lungs revealed slight chronic bronchitic changes.

Dr. Vickery said that the child's facies was typical of *lipodystrophia progressiva*; there were undue prominence of the zygomatic arches, hollowing of the cheeks and considerable furrowing of the corners of the mouth on smiling. The clavicles and the intercostal spaces were also unduly prominent in many cases, but the lesion had not progressed to any degree to the upper part of the trunk and arms as in some cases. It might extend down as far as the pelvic girdle. The condition might become spontaneously arrested at any level. The child was symptomless and there was no known treatment. When the patient grew older the effects of the lipodystrophia in the face became less noticeable, and this should be explained to the parents.

Nephrosis.

Dr. Vickery next showed a male patient, aged eight years, who had first been admitted to hospital in December, 1940, because of insidious swelling of the face and legs; the child presented the typical picture of nephrosis. Generalized œdema and ascites developed, which waxed and waned for the next six months, the ascites requiring frequent aspiration. Innumerable methods to establish increased diuresis were employed, with mostly unsatisfactory results; some of the methods attempted were the administration of urea, potassium nitrate, theocine sodium acetate, digitalin, caffeine, "Solergan" and "Neptal". *Paracentesis abdominis* and the administration of "M & B 693" when any elevation of temperature was present and the administration of a blood transfusion appeared to produce the best diuresis.

In July, 1941, pneumococcal peritonitis and pneumococcal empyema in the left side of the thorax developed. By means of aspiration of the abdomen and drainage of the left side of the thorax, blood transfusion and the exhibition of "M & B 693", the child recovered, lost all his œdema and regained apparent health by October, 1941. For the next twelve months he enjoyed comparatively good health at home, but on all occasions during this interval his urine contained a moderate cloud of albumin, and he had mild recurrences of localized œdema, especially when he suffered from any minor infection, particularly upper respiratory tract infections. In 1943, during two respiratory infections, the œdema and ascites returned; but after several weeks' rest in hospital with a diet rich in protein he became well enough to return home. In May, 1944, he became œdematous again, and the ascites returned. Since that date he had been bed-ridden, with considerable ascites and œdema.

Dr. Vickery said that on the supposition that the child had a pneumococcal focus, the toxin from which was irritating his kidneys, he was given 2,000,000 units of penicillin; but this failed to be of any use. He had had a number of sharp rises of temperature with acute abdominal pain, all of which had responded to sulphadiazine or sulphathiazole; but on no occasion recently had cultural examination of the ascetic fluid yielded a growth of pneumococci. Every six to eight weeks a *paracentesis abdominis* was carried out, and up to twenty pints of fluid were drained off over a period of four or five days. The child's systolic blood pressure was now 110 millimetres of mercury, and the blood urea level was 70 milligrammes *per centum*. Examination of the urine revealed a heavy cloud of albumin, a few hyaline casts and an occasional red blood cell.

Dr. Vickery finally showed a female patient, aged six years, who had been admitted to hospital on March 14, 1945. She had had swelling round the eyes for three weeks previously, followed by swelling of her body generally, particularly of the abdomen. The urinary output was diminished at first.

On examination, the child was puffy-faced; her colour was good, her tongue was coated, and her fauces were clear. Generalized œdema of the back and lower limbs was present, with some ascites. The chest appeared normal. The cardiac second sound was accentuated, and the systolic blood pressure was 114 millimetres of mercury. The urinary output was about fourteen ounces in twenty-four hours. Examination of the urine revealed a faint cloud of albumin, and four or five leucocytes and four or five red cells per high-power field; numerous granular and cellular casts were present. The blood urea level was 58 milligrammes per 100 cubic centimetres. The blood cholesterol level was 470 milligrammes per 100 cubic centimetres of serum. On a throat swabbing an occasional colony of hæmolytic streptococci was detected. One week later the urinary output was still diminished. Examination of the urine revealed a solid cloud of albumin with a faint trace of blood. The diet consisted of fruit juices, stewed fruit, jelly and toast, and a limited amount of fluid. The child was treated with sulphathiazole for three weeks, and given a magnesium sulphate enema every day. At the time of the meeting she was still œdematous and still had a diminished urinary output.

Dr. Vickery said that these two patients were shown to illustrate the nephrotic syndrome. The latter of the two cases was of recent onset, and as yet pneumococcal peritonitis had not developed. Prior to 1938, at the hospital in a small proportion of cases of nephrosis spontaneous recovery occurred; in the majority pneumococcal peritonitis developed and the patients died. Since 1938 a number of patients had developed pneumococcal peritonitis and had been given intensive treatment with the sulphonamides and blood transfusion, and had made apparent complete recovery. The brother of the first of the present two patients was one of them. It appeared that true nephrosis was the reaction of the kidney to the pneumococcal toxin, as opposed to acute nephritis, which was the reaction of the kidney to the streptococcus and staphylococcus in particular.

NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioner has been released from full-time duty with His Majesty's Forces and has resumed civil practice as from the date mentioned:

Dr. Robert Officer, 81, Collins Street, Melbourne (May 1, 1945).

Obituary.

JAMES WILLIAM BARRETT.

SIR JAMES BARRETT was so widely known in every State of the Commonwealth that his name had become almost a household word among persons devoted to science, art and social problems. His personality was so striking, his presence so commanding, and his word so incisive that precedence was granted to him naturally and without hesitation. Throughout his long career he took part in almost every aspect of communal life—the breadth of his interests and the depth of his knowledge compelled this activity. To converse with him on almost any subject with a cultural background or with sociological colouring was to be caught up at once and carried into the intricacies of the subject. Here was no dabbler, no traveller who passed on his way content with surface knowledge; he had a gift for discovery of basic facts and principles and for their assimilation, and on them he built a superstructure complete in many details. It was inevitable that a man so gifted as he, so impelled by his knowledge and vision, should strive to translate his ideas into action, and inevitable also that in his striving he should come into conflict with others who thought differently. No strong-minded man journeys far in life without meeting opponents and also without making enemies. It was so with James William Barrett. He was not always right. To expect such perfection would be ridiculous. It can be claimed, however, that he was convinced of the justice of his many causes and that he was logical in his plans and determined in his actions. It was said of him by some persons that the inevitable presence of his finger in any public pie was a sign of his conceit, of his determination not to be kept out of the public eye; others, less captious and perhaps without much personal interest in public pies, saw that his widely ranging mind could not by-pass an opportunity for action in a matter that seemed to him to demand it. There is no doubt that in the death of James William Barrett Australian medicine has lost a member who was true to the highest traditions of the profession, and the Commonwealth, a citizen who laboured abundantly in the public welfare.

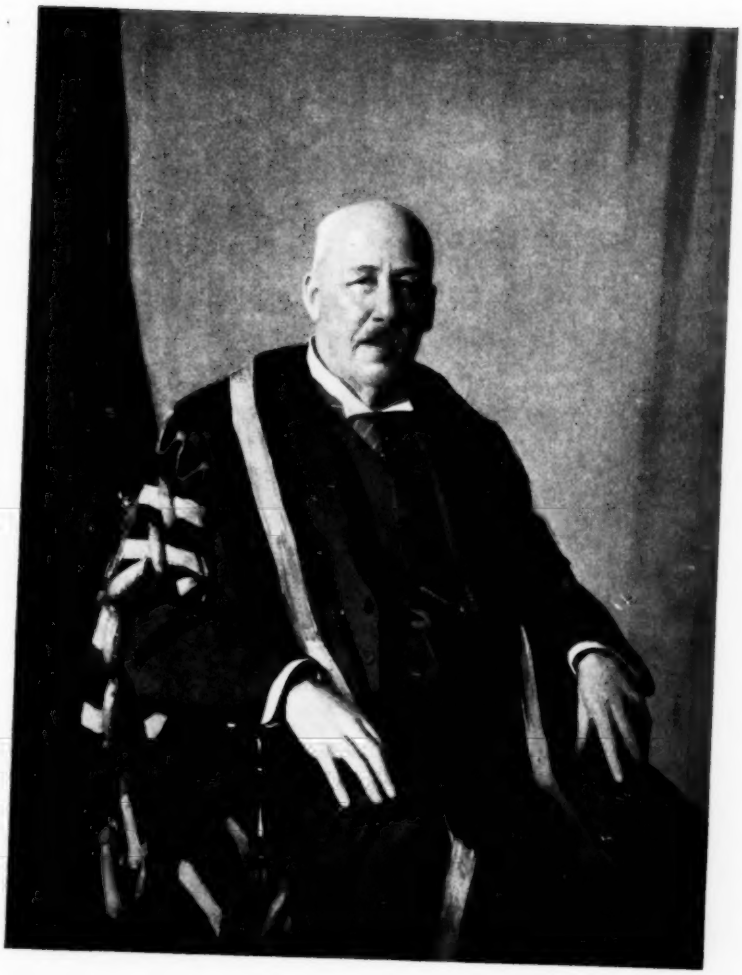
James William Barrett was born eighty-three years ago. His father, Dr. James Barrett, came to Melbourne as medical officer of an immigrant ship in 1859, and soon after his arrival was appointed resident medical officer at the Lying-In Hospital. He subsequently practised at Emerald Hill. James William was the eldest of nine children; his mother died when he was twelve years of age. He embarked on his medical studies at the University of Melbourne at an early age and graduated Bachelor of Medicine in 1881; he took his Bachelor of Surgery degree in the following year. In 1888 he took the higher degree of Doctor of Medicine and in 1889 became Master of Surgery. On graduation he became resident medical officer at the Melbourne Hospital. From the first Barrett must have determined to equip himself in as complete a fashion as possible, for in 1883 he took his first journey to England and sat for the examination of Membership of the Royal College of Surgeons of England; in 1887 he obtained his Fellowship. In London he became demonstrator of physiology at King's College and acted as clinical assistant at the Royal London Ophthalmic Hospital (Moorfields Eye Hospital). Later he served as clinical assistant at the Central London Throat, Nose and Ear Hospital. He found time to visit the Continent and attended a course in bacteriology in Berlin, the course being directed by Robert Koch. On his return to Australia he became connected with the Victorian Eye and Ear Hospital as assistant ophthalmic surgeon and lectured in physiology at the University of Melbourne. This association with the university became closer and was one of the chief activities of his professional life. Professor Osborne and Mr. Justice Lowe, the Chancellor, have described the devotion of Barrett to the interests of the university in their appreciations that are published herewith. In 1893 Barrett became full surgeon at the Eye and Ear Hospital; he was senior surgeon in 1907 and eventually became honorary consulting ophthalmic surgeon. He served the Melbourne Hospital as ophthalmologist, receiving his appointment in 1913, and later attaining honorary consultant rank. Among the other appointments held by him were those of consulting oculist to the Royal Australian Navy, oculist to the Repatriation Hospital, Caulfield, and the Pilot Services, and honorary oculist to the Royal Victorian Institute for the Blind.

Of Barrett's service in the war of 1914-1918 Colonel A. Graham Butler has written from the wealth of his knowledge as official historian. It only remains to add that for his services he was mentioned in dispatches on two occasions; he was made Companion of the Most Distinguished Order of Saint Michael and Saint George in 1911, a Companion of the Most Honourable Order of the Bath (Military Division) in 1918, and a Knight Commander of the Most Excellent Order of the British Empire also in 1918. He was the recipient of the Order of the Nile (third class).

The British Medical Association naturally claimed Barrett's attention. He was a member of the Victorian Branch and became its President in 1930. At a meeting of the Branch Council held soon after his death the following resolution was adopted:

> The Council of the Victorian Branch of the British Medical Association records with regret the death of Sir James William Barrett, K.B.E., C.B., C.M.G., M.D., M.S., F.R.C.S., LL.D., C.M.Z.S., who died on April 6, 1945, after a life-time of public service.
>
> Professionally he will be remembered as a distinguished ophthalmologist, while in public life he held a great many offices, including that of Chancellor of the University of Melbourne.
>
> The Victorian Bush Nursing Association remains as one of the greatest monuments to his memory, and the British Medical Association was honoured by his appointment as President in 1935.
>
> The Council offers its sympathy to Lady Barrett and the family of the late Sir James Barrett.

Barrett received his greatest professional honour, however, in 1935, when he was elected president of the whole Associa-



James W Barrett

tion. The Home Authorities had decided that the 103rd annual meeting should be held in Melbourne. In accordance with the usual custom the Victorian Branch proceeded to nominate one of its members for the office of president. The choice fell on Sir Richard Stawell, but he did not live to fill the post. A second nomination had to be made and Barrett was chosen. The wisdom of the choice was clear from the time that he accepted nomination. He filled the office with distinction and dignity, and as Sir Henry Newland states, he impressed the many visitors to the annual meeting from overseas. In proposing Barrett's health at the congress dinner, the Right Honourable Lord Horder said that it was difficult to choose which of Barrett's attainments he should mention. He said that the fact that Barrett was a distinguished ophthalmic surgeon seemed to be the least of his claims to their admiration and respect. He seemed to have been the pioneer in all the things that one could think of by which the human race might be bettered and improved—public health, medical education, the provision of playing fields and public parks, music for the people, the preservation of the flora and fauna of the country. This statement was perfectly true; its only defect was that other matters might have been added to the list. Lord Horder stated that most dear to Barrett of all his activities was the Victorian Bush Nursing Association, and it will be remembered that his president's address, published in the issue of October 5, 1935, was devoted to the activities of this body and to hospital problems generally. It was inevitable that many stories should be elaborated and told around the multifarious activities of such a man. Perhaps it will not be out of place to retell the story told by Dr. A. L. Kenny at the association dinner. Dr. Kenny told how:

> On one occasion a visitor arriving in the city of Melbourne was alarmed to see immense crowds flocking to the streets leading to the Town Hall and proceeding up the steep Collins Street hill, from building line to building line. In his alarm the visitor asked the policeman on point duty: "What on earth has happened; is it civil commotion, a riot, an earthquake or a fire?" The policeman replied: "Do not worry, it is only a slight inadvertence on the part of Dr. Barrett's secretary; he has summoned all the doctor's committee meetings for the same date."

In the year 1936 Barrett journeyed to England to instal his successor in the office of president at the annual meeting of the Association at Oxford.

When the ophthalmologists of Australia in 1939 decided to form a society that would include every State of the Commonwealth the Ophthalmological Society of Australia was formed as a special group within the ambit of the British Medical Association. Barrett was elected first president. He chose as the subject of his president's address "Blindness, Partial Sightedness and the History of the Braille Type". This address was in some ways a confession of faith, and it must have been one of the last of his addresses to be published. He summarized the business of oculists as being "to try to prevent blindness, to deal with disease and injuries of the eyes when they come before us, and to provide for the education of the partially sighted and to furnish all the assistance we can to render the lot of the totally blind as useful as possible". It was noticeable that whenever Barrett attended meetings of the Ophthalmological Society of Australia his contributions to the discussions were always not only pertinent but worth while; his advancing age did not seem to damp his ardour or lessen the value of anything that he had to say. In regard to matters ophthalmological, as well as other matters that claimed his interest, he held views that he thought should be promulgated. He was a voluminous writer to newspapers and also to this journal. He often wrote letters giving information not intended for publication. Any discussion on an ophthalmological subject would always be followed by a letter addressed to the Editor, but not necessarily for publication.

Barrett's chief interest, especially in his later years, lay in the Victorian Bush Nursing Association. This body was initiated in 1911 and Barrett became its honorary secretary; he was still honorary secretary at the end of his life. The many hospitals that are being carried on successfully throughout Victoria under the ægis of this society are his greatest living monument. The history of the Bush Nursing Association cannot even be outlined in this place, but medical practitioners know the value of the work, and those who have worked in Bush Nursing hospitals would not like to be deprived of them. The work of these hospitals stands as an example of community effort and will repay study at the present time.

Of Barrett's other interests much might be written. In the four tributes published herewith some of them have been mentioned. He was the author of several books and his contributions to medical journals, if enumerated, would occupy much space. Cicero held that the master should bring honour to his house; the house of Barrett's activities had many rooms and honour dwelt in every one of them.

SIR HENRY NEWLAND writes: My friendship with Sir James Barrett dates from early in this century. The voyage to Egypt in the troopship *Kyarra* (a craft of unlamented memory) afforded ample opportunity for assessing the gifts with which he was endowed or which he had developed. In the annals of the medical profession in Australia he stands out as its Admirable Crichton. Testimony in support of this statement is afforded by Lord Horder's remarks in proposing the President's health at the annual dinner of the British Medical Association in Melbourne in 1935. "He seemed to have been a pioneer in all the things that one could think of by which the human race might be bettered and improved", and Lord Horder then proceeded to enumerate them. Sir James's fine presence and a voice in keeping with his physique, associated with an oracular manner of delivering his quasi-delphic utterances, had a convincing effect on his listeners. The acme of his distinguished professional and medico-political career was his election at short notice as President of the British Medical Association when it met in Melbourne in 1935. The death of Sir Richard Stawell not long before the meeting, made it necessary to choose a successor, and right well did Sir James prove himself worthy of succeeding to the highest official honour the British Medical Association can bestow. He greatly impressed the distinguished members of the Association who came from overseas. In the following year, on behalf of the Branches in Australia, he attended the annual meeting of the British Medical Association at Oxford and added to his reputation. He returned to Australia with a mass of useful information on various aspects of medical science in Britain and the United States. In his presidential address on "Hospital Problems" at Melbourne he said that he felt justified in stating that "the fault of the present hospital system is that the economic gap between the public hospitals and the so-called intermediate hospitals and the private hospitals is too great and should be bridged by a contributory system". The success of the hospital contributory organization in Sydney shows that he was right. His remarks in his address on nationalization of the hospitals and the medical profession and on recasting the training of nurses are today very pertinent. The address well repays perusal.

Sir James Barrett was unquestionably a man of mark, and has left a lasting impress on the generation he served so well.

MR. JUSTICE LOWE, Chancellor of the University of Melbourne, writes: I speak only of Sir James Barrett's connexion with the university with which he was associated for so many years, both as member of the council and as lecturer. He was first elected to the University Council on January 10, 1901, and remained a member of it in its various forms until his death. He became Vice-Chancellor in December, 1931, in succession to Sir John Monash, and retained that office until 1934, when the creation of the office of paid Vice-Chancellor brought about a renaming of the position he held. From then to August, 1935, his office was that of Deputy Chancellor. In August of 1935 he became Chancellor in succession to Sir John Macfarland and held the office until March, 1939. During all this long period his interest in university matters never flagged, and it is safe to say that no one during the last generation exercised a greater influence in the development and activities of the university. He was always alert to expand the university's work, especially on the technical side. Indeed there are some who think that his interest in this direction has caused a want of balance in the university's development. However, the most recent expansion of university chairs has done something to bring about a better balance, and the ultimate result may not be unsatisfactory. My personal association with Barrett came rather late in his life, but, during the last twenty years, I saw at first hand the tremendous capacity and energy of the man. His interests lay in many directions and there was scarcely any subject of debate to which he did not bring useful opinion and criticism. His careful preparation beforehand often carried the debate in his favour where, if his opponents had been equally prepared, the decision might have gone the other way. He was not always successful in carrying his point, but sometimes, when he failed, he had the satisfaction of discovering by experience that his view was proved right. In addition to his interest in scientific

matters, and especially his own profession, he was deeply interested in musical affairs, and was, till his death, the chairman of the Conservatorium Finance Committee. The work of the University Extension Board, which had been created largely through his efforts, engaged his attention till the last, and, at his death, there stood on the business paper of the council a notice in his name bearing on the development of its activities in the future. Increasing age with him scarcely affected his forward-ranging outlook. All in all, his influence was a vital one in the university, and we shall miss him as the years go on more perhaps than we now realize.

PROFESSOR W. A. OSBORNE writes: My acquaintance with Sir James Barrett began when on my arrival in Melbourne in March, 1904, I found that he was honorary lecturer on the physiology of the special senses in the university. This course, illustrated with many pieces of apparatus and models, all from his private collection, continued until 1935. Barrett's earliest physiological research was conducted with Professor Yeo, of King's College, London, and was concerned with confirming or otherwise the views of Halford on the origin of the first heart sound. His first duties as demonstrator in physiology took place in Melbourne in 1887. His subsequent research was directed towards the comparative physiology of vision, and many important facts were elucidated as to refractive errors and range of accommodation in the mammalia. Our relations were always of the most pleasant character and I received much help from him both in his private capacity as friend and host and as member of the governing body of the university. He was always interested in the medical student, and had been, in 1880, the first Honorary Secretary of the newly formed Medical Students' Society. Barrett's special qualities which aroused my admiration were: (i) A remarkable grasp and memory of detail. (ii) Imperturbable temper in debate and particularly if voting went against him. (iii) Organizing ability of a high order and rapid mastery of the problem before him. Often I found him the only man at a meeting with a constructive scheme ready, and when this was adopted there would be amongst his critics, and he had many, resentment that "Barrett had got his own way again". (iv) Reference to experts in matters which lay outside his own studies and experience and immediate acceptance of their opinions. (v) Defence and encouragement of the researcher who was enthusiastically following some line of investigation which critics, both intramural and extramural, considered detached from immediate practical issues.

COLONEL A. GRAHAM BUTLER, Medical Historian of the war of 1914-1918, writes: The epigram *de mortuis nil nisi bonum* has always seemed to me to carry a covert insult both to the dead and to the living. To the dead, that it suggests that they could not, without discredit, face four-square the impartial judgement of history. To the living, that—as of men and not of gods—it involves either cowardice or insincerity. There is no help in history, nor merit in obituary, save in entire veracity of thought and word. Such courtesy is right and due from his fellows to so great a citizen, so fine a philanthropist, and so distinguished an officer as was Lieutenant-Colonel Sir James W. Barrett. War brought out in him—as war does—to the full, his immense abilities, his astonishing energy, vision, resource, and an inspiring and contagious enthusiasm. It brought out also other elements in his make-up which we may not neglect if we wish to see the man himself: an expansive self-assurance and self-sufficiency that is so nearly akin to ambition that it, too, must be held an "infirmity of the noble mind", and thereto most prone when fools fear and fail to tread, where courage, insight, vision, would call to press on. In the course of his war work Sir James Barrett did outstanding service for the army and the Army Medical Service, for war medicine, for humanity and for his country. He was given great responsibilities and received great and deserved honour. But in its course also he sustained grievous mental and moral shocks, and suffered great anguish; both private, as in the death of his splendid soldier son, and public, in attacks more bitter and more violent than any to be found in the annals of the Australian Army Medical Service or profession. That against these slings and arrows Barrett was able so to conduct himself and order his activities as to achieve a great present success and ultimate triumph seems to justify, indeed to require, that this phase of his life be examined with the same honesty and understanding as should inform the record of his career as a whole. For such a study ample material is available in the Australian War Memorial.

Barrett's work in the war of 1914-1918 presents in two phases: the first in the Australian Army Medical Corps, with the Australian Imperial Force; the second with the Royal Army Medical Corps. His official war record is as follows:

19/10/14: From Reserve of Officers appointed Major, A.A.M.C. (substantive rank), in the Australian Imperial Force. 5/12/14: Embarked for overseas. 6/5/15: Promoted Lt.-Col. 28/2/16: Appointment terminated. 29/2/16: Appointed Lt.-Col., R.A.M.C. 14/1/19: Appointment terminated. 19/2/19: Embarked for R.T.A.

During the whole of this time Barrett was engaged in arduous, exacting, responsible, and extraordinarily varied duties. At the same time, he took a leading part in Red Cross work and in the Young Men's Christian Association in Egypt—of which he wrote a history. He was in close touch with military, scientific and national affairs, and was secretary or president of various committees, scientific and administrative. He wrote three important books, besides reports, pamphlets and innumerable letters. He entertained extensively. And during 1915 he was engaged in meeting a bitter and determined attempt—which almost succeeded—to oust him from the medical service. It is possible here only to note in barest outline the course of events, and appreciate their significance as concerns Sir James Barrett as an officer of His Majesty's Forces.

Service with the Australian Army Medical Corps.—Barrett embarked in the Hospital Ship *Kyarra* with No 1 Australian General Hospital as oculist and aurist. Arriving in Egypt, where the Australian Imperial Force was in training, he took over, in addition, the duty of registrar to the hospital. The general course of events in this most eventful year are, or should be, known to all. It must suffice here to recall that the medical arrangements for the Dardanelles campaign were even more haphazard and scratchy than for the campaign itself. Indeed, a major medical disaster for a time threatened. Barrett's part in events may conveniently be presented by quotation from the Australian Medical History of the War:

> At the beginning of April not one bed was available for wounded in the Australian hospitals. On his return from the Dardanelles on March 26th General Birdwood conferred with the D.M.S., A.I.F. The registrar of No. 1 Australian General Hospital, Major J. W. Barrett, also had special opportunities of learning from him the trend of events, and became deeply impressed with his estimate of the casualties to be expected. This officer, a man of exceptional insight and organising ability, and temperamentally inclined to concern himself with the wider aspect of affairs, was not disposed to await instructions where he saw necessity and opportunity for action. His administrative and social initiative had at an early date brought him and his unit prominently before the D.M.S. for the Force in Egypt; he was at this time also closely in touch with the D.M.S., A.I.F., who, having no staff of his own except a staff sergeant, and being excluded from effective knowledge of events or opportunity for participating in arrangements, came to rely on him. These circumstances, and the special situation of No. 1 General Hospital, made it inevitable that this unit should become prominent in medical events at the base of operations. . . . Situated advantageously, and administered with restless initiative, this unit entered upon an ambitious and far-sighted programme of expansion.

On June 21, as a personal appointment, Barrett was given by the British Director of Medical Services for Egypt a position as "A.D.M.S. for Australian Forces". Thereafter, in the absence in England, and subsequent reduction of Surgeon General Williams—with whom he had loyally cooperated—Barrett became, in effect, the Director of the Australian Army Medical Services in the East. For the events of this extraordinary campaign, and for Sir James Barrett's part therein, those interested must be referred to the Australian "Medical History". My duty requires only that I outline the course of events as these concern Barrett himself. Briefly, largely through his initiative, No. 1 Australian General Hospital became the centre of a huge improvised hospital expansion, in many respects highly efficient, but lacking many of the amenities which normally should and could be supplied to the sick and wounded. At the same time Barrett's duties had multiplied beyond all reason, let alone military precedent. The denouement is thus recorded in the Australian Official Medical History:

> Discontent at the unmilitary and irregular situation in the Australian medical service in Egypt, and dissatisfaction with the quality of medical and nursing ministrations permitted by the conditions in the Australian auxiliary and convalescent hospitals, became associated with a growing exasperation at the retention by the "A.D.M.S., Australian Force" (an officer without any previous military experience), of a multiplicity of

other appointments of most varied and important kinds. Indefatigable and endowed with vision, organising ability, and an enormous capacity for hard work, this officer had played an important part in a grave crisis, and the D.M.S. for the Force in Egypt permitted a most improper multiplication of his responsibilities. The appointments held by him at the end of July, in addition to his positions as Assistant-Director of Medical Services for the Australian Force in Egypt—and (in effect) officer to the medical section of the A.I.B.D.—included those of registrar to the huge hospital system controlled by No. 1 A.G.H., executive officer for the Australian Red Cross Society abroad, ophthalmologist and aurist to No. 1 General Hospital, and consulting ophthalmologist to the British Force in Egypt. For most of these he was well qualified, but response to so many and so varied demands could not be fully effective. . . . Many Australian officers who were content to do their own work saw with apprehension that it was impossible for one man to fill with propriety such a multiplicity of positions. . . . Letters had been permitted to appear in the Australian Press criticising the conditions under which Australian sick and wounded were treated in Egypt and seriously impugning the conduct of the commanding officer and registrar of that hospital.

At the request of the Australian Government an inquiry was held by the War Office, as the result of which, among other important changes—

A new registrar was appointed, and on August 23rd the position of "A.D.M.S., Australian Force" was terminated (as it had begun) by a personal letter of the D.M.S. for the Force in Egypt. The registrar himself was permitted to resign from the Australian Force and was subsequently given an appointment in the R.A.M.C.

Colonel Barrett has consistently affirmed that all these duties were in effect thrust on him by the Director of Medical Services for Egypt, and there is probably much truth in the statement. At all events, throughout the affair he was strongly supported by officers of the British Service, including the Director-General of Medical Services at the War Office, Sir Alfred Keogh, and by the High Commissioner for Egypt, Sir Henry McMahon.

Service with the Royal Army Medical Corps.—Immediately on the termination of his appointment in the Australian Army Medical Corps, Barrett was commissioned, with the same rank, in the Royal Army Medical Corps, and took up duties in Egypt under the Director of Medical Services, English Expeditionary Force. The course of his service in the Royal Army Medical Corps cannot here be followed. It must suffice to record that his conduct of his two chief—and coincident—responsibilities, namely, senior consultant in otology to the English Expeditionary Force, and president of the Permanent Medical Invalid Board, brought him, besides the K.B.E. and other honours, the confidence of the several directors of medical services, and a high regard of generals commanding, including Sir Edmund Allenby. In the first, Barrett reorganized the consultant system on very exact lines which seem, however, to have worked well. His pamphlet on the treatment of chronic middle ear disease in the army is an admirable statement on the most difficult problem. He took as well a close interest in the varied aspects of eye work in Egypt. He made valuable observations on night blindness due to pellagra in Turkish prisoners of war; and his appreciation of the problems of vision in the army have never in my knowledge been better stated. As president of the Permanent Medical Board he initiated reforms which not only were of great value to the British Force in the East—"they saved two divisions of infantry for the front"—but set a standard which influenced military procedure. "All the Law and the Prophets" of medical boarding are summed in a statement on the "ever present nightmare of the 'B' class problem".

I do not believe that any system will succeed in a proper combing out except it enjoy, not only the personal acceptance, but the active and enthusiastic support of all Officers in Command of these men.

Some few years ago Sir James began to collect and roughly collate the voluminous records which, *more suo*, he had assembled and preserved during his war service. In 1936 he offered the bulk of these unconditionally to the Australian War Memorial. They were gladly accepted, and a preliminary survey was made under the direction of the Acting Director, Mr. T. H. E. Heyes. Then, last year, Sir James made available the remainder of his collection. As a member of the Australian War Memorial staff I was desired by the Acting Director, Mr. A. W. Bazley, to take delivery of and catalogue them. Besides some weeks of work, this gave me a day with Sir James and Lady Barrett at their home in Toorak. I think it is pertinent to this note to recall the kindliness and understanding which informed his talk. Sir James made it quite clear, however, that he still felt that he had been done grave injustice, and that he believed the documents to be both important in themselves and a record of valuable service. This attitude I was able cordially to endorse.

The following letter, sent to Sir James by the Acting Director, seems to me to sum up justly the significance of Barrett's war service. At the same time I feel it my duty to record that, so far as I am concerned, "appreciation" of this episode in Australian "Medical History" given in Volume I "stays put". . . .

My dear Sir James Barrett,

By this post you will receive a copy of a typed List and Catalogue of the documents contained in the collection presented by you to the Archives of the Australian War Memorial in 1936 and 1943. The List has been prepared by Colonel A. G. Butler, Australian Official Medical Historian, War of 1914-18. At my request Colonel Butler has annotated the List by explanatory notes and comment, based on his knowledge of the events to which they relate. . . .

In a memorandum to me as Acting Director, a copy of which I have appended to the List, Colonel Butler says:

"I have formed the opinion that these Records constitute a very valuable 'Archival Unit'—as it may be termed; and suggest that the Australian War Memorial is greatly indebted to Sir James Barrett for thus making them available in perpetuity to the nation."

With this opinion I fully concur; and on behalf of the Australian War Memorial Board ask you to accept my most cordial thanks for this valuable contribution to the Australian War Achives.

CHARLES PERRY.

WE regret to announce the death of Dr. Charles Perry, which occurred on June 5, 1945, at Cheltenham, Victoria.

GUSTAVE ALFRED HAGENAUER.

WE regret to announce the death of Dr. Gustave Alfred Hagenauer, which occurred on June 29, 1945, at Sale, Victoria.

Correspondence.

THE FUNDS OF THE ASSOCIATION.

SIR: Many of us have responded to the appeal by Dr. E. A. Tivey for a donation of up to £3 3s. for the Federal Council of the British Medical Association so that its activities on our behalf may be financed.

It is, in my opinion, nothing less than a disgrace to the British Medical Association that its Federal Council should have to beg for money to carry out its important duties, especially in these critical times. Apart from the fact that voluntary donation is always an unfair method, whereby willing horses give some of their oats while mean ones are content to partake of the extra ration benefits so provided, it is high time that we showed in practical form some evidence of that unity which the lay public assumes us to exhibit.

Whatever criticism has been levelled at the Federal Council in the past, it must be obvious to all who take an interest in the proceedings of our Association that for some time now the Federal Council has been carrying out efficient and all-important work on our behalf as evidenced by the very sound plans recently brought before all the local associations by Dr. John Hunter.

Does everyone realize that the Federal Council has no funds of its own, and further that there is an archaic and obstructive rule that does not allow it to build up a reserve fund from any donations received from the State Branches? In my opinion our constitution is twenty years out of date,

and the above rule should be immediately struck out of the constitution.

It is time a bold and vigorous move was made to strengthen the fighting arm of our Association in its efforts to maintain the right of our profession to freedom from bureaucratic coercion. We all know the plans that have been put before us for the creation of a medical benefit scheme of our own, acceptable alike to us and to our patients. To organize, advertise and implement this, and to carry out other vital negotiations, our Federal Council needs money. There is only one equitable way to raise this money, and that is by raising the annual subscription.

Let the State Branches write to us and say: "These are critical and momentous times and the problems before us demand equally momentous decisions and actions. To carry out necessary measures the British Medical Association urgently needs money. It has therefore been decided to double the annual subscription and the extra amount of subscription for this year is now due and payable."

I know that the Council had difficulty recently in obtaining an increase of one guinea in the subscription, but time gallops on and a great crisis is upon us. I know also that few of us have much spare cash in these days of flattening taxation, but surely a few extra pounds *per annum* is a small price to pay to ensure the efficient functioning of our representative bodies, so that they may preserve for us our status as a free profession, worthy of continued independence in the light of past service and tradition.

Yours, etc.,

ARTHUR D'OMBRAIN.

Bank Chambers,
17, Bolton Street,
Newcastle.
June 28, 1945.

THE NOTIFICATION OF CASES OF HYDATID DISEASE.

SIR: Hydatid disease was proclaimed a notifiable disease under the *Health Act* in Victoria in July, 1926. Since then, until December 31, 1944, only 264 cases have been notified by medical practitioners to the various local health authorities. In the same period 279 deaths have been registered in the State as being due to hydatid disease.

Victorian Year Books from 1915 to 1930 showed that there is a ratio of one death to every seven cases admitted to public hospitals as suffering from hydatid disease. This ratio also obtains in respect of one country base hospital (Hamilton) in the last thirty years. One is justified then in assuming that there have been in actual fact, not merely 254 cases, but somewhere about 2,660 cases in the period since 1926. That is, less than one case in ten has been reported.

Now I know, from a careful personal check-up, that the medical practitioners in the country portions of the Western Health Area of Victoria have reported to the local health authorities every case as it has been diagnosed ever since the disease was made notifiable. The result is that in the period 1926-1944, 136 of the 254 reported cases have been notified in the Western Health Area. In the same period only 44 cases have been notified in Melbourne and suburbs. While admittedly it must be most exceptional for a person to contract the disease in the metropolitan area, it is hardly to be credited that in the surgical centre of the State only 44 cases have been diagnosed and treated in seventeen and a half years!

My experience has been that medical practitioners are as a rule careful to report cases of infectious disease when they know that prompt administrative action follows the notification, but cannot see the force of filling up a form when nothing happens as a result of their doing so. And, of course, when the patient is apparently living in the city or suburbs there is nothing for the local health authority to do in the matter. It is different, however, in rural areas, and I would like medical practitioners in the metropolitan area and in the provincial centres (where the same conditions apply) to know that, in the country areas of this health area at any rate, administrative action does follow notification. The municipal health inspectors visit the home of every reported patient, inquire into whether home killing is carried out, and if so, into the methods of offal disposal, and besides reporting the results of such visits to their medical officers of health, take the opportunity of instructing all those concerned in anti-hydatid precautions.

Most patients diagnosed in the city or suburbs, or provincial centres, come, it is to be presumed, from rural areas. City, suburban and provincial doctors could do a great deal to help us by finding out in each case that comes under their notice whereabouts the patient has lived in the country, and by notifying the country municipality concerned, so that the opportunity for education in preventive measures may not be lost. Incidentally the notifications would then provide a far more accurate picture of the geographical distribution of this disease in this State.

Yours, etc.,

GEORGE COLE,
District Health Officer, Western Health Area, Victoria.

Geelong,
Victoria,
June 28, 1945.

THE MANAGEMENT OF PEPTIC ULCER.

SIR: In the journal of June 2 Dr. L. J. J. Nye presented a fine article on the management of peptic ulcer. However, he made but scant mention of the pernicious influence of coffee and other caffeine-containing beverages on this condition.

For many years it has been generally debated and inadequately realized that coffee produces a strong secretagogue action on the gastric mucosa, but it is only recently that those excellent physiologists, Roth and Ivy, have scientifically demonstrated the magnitude and duration of this action. They have summarized their work, complete with bibliography, in *The Journal of the American Medical Association*, Volume CXXVI, page 814.

Roth, Ivy and Atkinson conclude that "the excessive use of caffeine-containing beverages may contribute to the pathogenesis of peptic ulcer in the ulcer-susceptible individual, may aggravate an ulcer already existing and may render the therapeutic management of the condition more difficult". They have also shown that tea has but small influence on gastric secretion.

Yours, etc.,

DAVID MONK ADAMS.

Sydney Hospital,
Macquarie Street,
Sydney.
June 29, 1945.

THE AUSTRALIAN NATIONAL CLOTHING COLLECTION FOR OVERSEAS RELIEF.

SIR: The Australian Council for UNRRA, under the patronage of His Royal Highness the Duke of Gloucester, and the chairmanship of the Right Honourable H. V. Evatt, K.C., M.P., has authorized an organization known as the Australian National Clothing Collection for Overseas Relief. The purpose of this collection is to obtain the largest possible quantity of good used clothing for free distribution to destitute men, women and children in the countries freed from the enemy.

In Europe alone 125 million people in the liberated countries are in dire need of clothing. Of these more than 30 million are children. The lives of these multitudes depend largely on the prompt filling of their clothing needs. President Roosevelt, in a message to Congress in September, 1944, said: "In occupied Europe almost as many people have died from exposure due to lack of clothing as have died from starvation." It is estimated that half the population will go barefoot this winter, and in innumerable instances attendance at school is precluded by lack of garments.

The aim is to collect five million pounds weight of clothing, footwear and blankets which can be either new or used. The clothing, which may be for summer or winter wear, should be in good repair and useful to the recipients.

An immediate collection must be made, as the clothing should be packed and shipped from Australia towards the end of July in order to ensure its arrival in the devastated areas before the onset of winter.

To arrange for the collection throughout the Commonwealth, every local mayor and shire president has been requested to form local committees in their particular areas and to arrange for the cleaning and transport of the goods to centres established in the various capital cities, where they will be sorted and baled ready for shipment. Arrangements have been made with the various State railways throughout the Commonwealth to transport all parcels free to the central depots. Donations of money, which will be utilized for the purchase of essential articles, will be tax free.

This appeal is addressed to members of the British Medical Association throughout the Commonwealth in the hope that not only will they give donations in kind, but that they will add their united weight to the formation and assistance of the local committees within their respective areas.

In addition to the local committees, there exists in each State a Regional Committee of the Australian Council for UNRRA, and this committee is assisting the clothing collection. The secretaries are:

Victoria: Miss Margaret Holmes, Australian Student Christian Movement, 182, Collins Street, Melbourne.
South Australia: Miss Irene L. Glasson, 112, Edward Street, Norwood.
Western Australia: Miss E. Gerrand, Perth Technical College, 137, St. George's Terrace, Perth.
Queensland: Major G. S. Alley, Salvation Army Headquarters, 167, Ann Street, Brisbane.
New South Wales: Mrs. H. J. Daly, Fifth Floor, Dymock's Building, 424, George Street, Sydney.
Tasmania: Mr. W. Asten, 21, Flint Avenue, New Town, Hobart.
A.C.T.: Miss Jones, c.o. Y.M.C.A., Civic Centre, Canberra.

The central address is Mr. C. Roy Stanley, Yorkshire House, 14, Spring Street, Sydney. Telegraphic address: "Natisers", Sydney. It is advised that any inquiries on matters of policy should be directed to the Sydney address.

Yours, etc.,

WILLIAM WOOD,
Member, Executive Australian Council for UNRRA and Representative of the Federal Council of the British Medical Association in Australia.

141, Macquarie Street,
Sydney,
July 2, 1945.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Numbers 123 and 126, of June 21 and 28, 1945.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Emergency List.

Promotion.—Surgeon Lieutenant Charles Patrick Cummerford Reilly is promoted to the rank of Surgeon Lieutenant-Commander, dated 31st May, 1945.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Appointment.—Kenneth Charles Crafter is appointed Surgeon Lieutenant, dated 14th May, 1945.

ROYAL AUSTRALIAN AIR FORCE.

Citizen Air Force: Medical Branch.

The probationary appointments of the following Flight Lieutenants are confirmed with effect from 10th May, 1945: J. E. Knight (267548), N. Kerkenezov (267618).—(Ex. Min. No. 152—Approved 27th June, 1945.)

Temporary Squadron Leader J. S. Burgess (261372) is granted the acting rank of Wing Commander whilst occupying a Wing Commander post with effect from 4th April, 1945.—(Ex. Min. No. 155—Approved 27th June, 1945.)

The probationary appointment of Flight Lieutenant H. R. Harris (267518) is confirmed with effect from 17th May, 1945.—(Ex. Min. No. 158—Approved 27th June, 1945.)

Reserve: Medical Branch.

The following medical practitioners are appointed to commissions on probation with the rank of Flight Lieutenant with effect from the dates indicated: Louis John Wienholt (277543), 26th March, 1945, Glen Vincent Hickey (257738), 7th April, 1945, Franklin John Gray (267808), 9th April, 1945.—(Ex. Min. No. 154—Approved 27th June, 1945.)

Temporary Squadron Leader S. W. Dobell-Brown (261658) is transferred from the Active List with effect from 14th April, 1945.—(Ex. Min. No. 161—Approved 27th June, 1945.)

DECORATIONS.

Surgeon Commander James Flattery, of the Royal Australian Navy, has been created an officer of the Most Excellent Order of the British Empire; he has also been mentioned in dispatches.

Post-Graduate Work.

FILM AFTERNOON AT SYDNEY.

THE Post-Graduate Committee in Medicine of the University of Sydney announces that sound films entitled "Intravenous Anæsthesia" and "Continuous Flow" will be shown at the Stawell Memorial Hall, 145, Macquarie Street, Sydney, at 4.15 o'clock p.m. on Wednesday, July 18, 1945. All civilian medical practitioners and service medical officers are invited to attend.

DEMONSTRATIONS IN MELBOURNE.

THE Melbourne Permanent Post-Graduate Committee announces that the following clinical demonstrations suitable for candidates for the M.S. Part II and F.R.A.C.S. examinations will be held on Tuesdays at 2.15 o'clock p.m. as follows:

July 17: by Dr. Leonard H. Ball at the Alfred Hospital.
July 24: by Dr. R. Kaye Scott at the Royal Melbourne Hospital, W.7.
July 31: by Dr. Thomas King at Saint Vincent's Hospital.

These demonstrations will be continued each week, the fee being £4 4s. for three months.

The following demonstrations in pathology suitable for candidates for the M.D. Part II and M.R.A.C.P. examinations will be held on Thursdays at 5 o'clock p.m.:

July 12: by Dr. R. J. Wright-Smith at the Pathology Department, Royal Melbourne Hospital.
July 19: by Dr. R. Webster in the Lecture Room, Children's Hospital.
July 26: by Dr. R. J. Wright-Smith at the Pathology Department, Royal Melbourne Hospital.

These demonstrations will also be continued each week, the fee being £3 3s. for three months.

Clinical demonstrations suitable for candidates presenting for M.D. Part II and M.R.A.C.P. examinations are also conducted each week.

Entries, accompanied by fees, should be sent to the secretary at the committee's office, College of Surgeons Building, Spring Street, Melbourne. Medical officers who have been on full-time active service during the present war are exempt from these fees, but must enrol before attending a course.

LECTURES ON "MALIGNANT CONDITIONS" AT MELBOURNE.

THE Melbourne Permanent Post-Graduate Committee has arranged for Dr. R. Kaye Scott to give a series of lectures on "Malignant Conditions" in the Lecture Theatre, Royal Melbourne Hospital, at 4.30 o'clock p.m.:

Monday, August 6: "Tumours of Skin."
Monday, August 13: "Carcinoma of Breast."
Monday, August 20: "Tumours of Bones."
Monday, August 27: "Tumours Involving Genito-Urinary System."
Monday, September 3: "Malignancy of Mouth and Glands of Neck."

The fee for this course is £2 2s., and entries should be in the hands of the secretary, Post-Graduate Committee, College of Surgeons Building, Spring Street, C.1, by July 23. Medical officers who have been on full-time active service during the present war are exempt from these fees.

University Intelligence.

THE UNIVERSITY OF MELBOURNE.

THE University of Melbourne announces that the next examination for higher medical degrees (M.D. and M.S.) will be held in September, 1945, and not in July as announced in the almanac. The commencing date of the examination will be Monday, September 10, and entries must be lodged not later than Saturday, August 18.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Symonds, Barry Cyril, provisional registration, 1945 (Univ. Sydney), 274, Old South Head Road, Bondi.

Medical Appointments.

Dr. Hugh McIntyre Birch, Superintendent of Mental Institutions, South Australia, has been appointed Deputy Director-General of Medical Services during the absence of the Director-General of Medical Services.

The following appointments have been made by the Board of Management of the Royal Adelaide Hospital: Honorary Surgeon: Dr. Philip Santo Messent; Honorary Gynæcologist: Dr. Brian Herbert Swift; Honorary Assistant Gynæcologist: Dr. Harry Medcalf Fisher; Honorary Assistant Radiologists: Dr. Harold Alexander McCoy and Dr. Joseph Stanley Verco; Honorary Anæsthetists: Dr. Allan Dunstan Lamphee, Dr. Donald Keith McKenzie and Dr. John David Rice; Honorary Assistant Anæsthetist: Dr. Robert Myer Hains; Honorary Clinical Physiologist: Professor Sir Stanton Hicks; Honorary Associate Radium Therapist (with status of Assistant Physician): Dr. John Christian Mayo; Honorary Ophthalmologist: Dr. Alfred Ladyman Tostevin; Honorary Assistant Ophthalmologist: Dr. James Alexander Rolland.

Under the provisions of the *Aborigines Protection Act*, 1909-1943 (New South Wales), Dr. John Grahame Drew has been appointed a member of the Aborigines Welfare Board as reconstituted on and from July 5, 1945.

Books Received.

"The 1944 Year Book of Obstetrics and Gynecology", edited by J. P. Greenhill, B.S., M.D., F.A.C.S.; 1944. Chicago: The Year Book Publishers Incorporated. 7" × 4¾", pp. 576, with many illustrations. Price: $3.00. Australian price: 23s. 6d.

"A Collection of Articles on the Electrical Factor in Metabolism", by W. N. Abbott, M.C., M.B., B.S. (Melb.), and E. F. Fowler, M.B., Ch.B. (Otago); Second Edition; 1944. Wellington, New Zealand: The Commercial Printing Company Limited. 9¾" × 5¾", pp. 250, with many illustrations.

"V.D. Lectures for Nurses", by Reynold H. Boyed, M.B., Ch.B., F.R.C.S. (Edin.), 1945. London: Heinemann Medical Books Limited. 7¼" × 5", pp. 24. Price: 2s.

"Constitution and Disease: Applied Constitutional Pathology", by Julius Bauer, M.D.; Second Edition; 1945. New York: Grune and Stratton. 8¼" × 5¾", pp. 261, with seven illustrations. Price: $4.00.

"Trauma in Internal Diseases with Consideration of Experimental Pathology and Medico-legal Aspects", by Rudolf A. Stern, M.D.; with foreword by Francis Carter Wood, M.D., 1945. New York: Grune and Stratton. 9" × 6", pp. 599. Price: $6.75.

"The 1944 Year Book of Neurology, Psychiatry, and Endocrinology", edited by Hans H. Reese, M.D., Nolan D. C. Lewis, M.D. and Elmer L. Sevringhaus, M.D.; 1944. Chicago: The Year Book Publishers Incorporated. 7" × 4¾", pp. 712, with many illustrations. Price (Australian): 22s. 6d.

"Pathology: An Introduction to Medicine and Surgery", by J. Henry Dible, M.B. (Glas.), F.R.C.P. (Lond.), and Thomas B. Davie, B.A. (Cape), M.D. (Liverp.), F.R.C.P. (Lond.); Second Edition; 1945. London: J. and A. Churchill Limited. 9¼" × 6¼", pp. 956, with 395 illustrations, including 8 plates in colour. Price: 45s.

Diary for the Month.

JULY 16.—Victorian Branch, B.M.A.: Hospital Subcommittee.
JULY 16.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
JULY 17.—Victorian Branch, B.M.A.: Organization Subcommittee.
JULY 17.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JULY 18.—Western Australian Branch, B.M.A.: General Meeting.
JULY 19.—South Australian Branch, B.M.A.: Council Meeting.
JULY 19.—Victorian Branch, B.M.A.: Executive Meeting.
JULY 19.—New South Wales Branch, B.M.A.: Clinical Meeting.
JULY 24.—New South Wales Branch, B.M.A.: Ethics Committee.
JULY 25.—Victorian Branch, B.M.A.: Council Meeting.
JULY 26.—South Australian Branch, B.M.A.: Scientific Meeting.
JULY 26.—New South Wales Branch, B.M.A.: Branch Meeting.
JULY 27.—Queensland Branch, B.M.A.: Council Meeting.
AUG. 1.—Victorian Branch, B.M.A.: Branch Meeting.
AUG. 1.—Western Australian Branch, B.M.A.: Council Meeting.
AUG. 2.—South Australian Branch, B.M.A.: Council Meeting.
AUG. 3.—Queensland Branch, B.M.A.: Branch Meeting.
AUG. 7.—New South Wales Branch, B.M.A.: Organization and Science Committee.
AUG. 10.—Queensland Branch, B.M.A.: Council Meeting.
AUG. 13.—Victorian Branch, B.M.A.: Hospital Subcommittee.
AUG. 13.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
AUG. 14.—Tasmanian Branch, B.M.A.: Ordinary Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract practice appointments in Western Australia. All Public Health Department appointments.

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